Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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ARNIE J. SUOMELA, COMMISSIONER

Commercial Fisheries Abstracts

DIVISION OF INDUSTRIAL RESEARCH AND SERVICES
BUREAU OF COMMERCIAL FISHERIES

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0 General and theoretical
1 Fish by species
2 Fresh fish
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8 Composition
9 Miscellaneous

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget November 23, 1956.

0.12 ULTRASONICS--NEW PROCESS TOOL FOR U. S. FOOD PACKERS

Sherwood, Peter W.
Western Canner and Packer 128, 20-21 (September 1959)

Industrial applications of ultrasonic waves in the processed-food industries have been developed during the past 4 years. Although ultrasonics presently is being used on a relatively small scale, its main fields of usefulness are becoming clear. From an engineering viewpoint, the two distinct areas of application for ultrasonics are measuring and process. Valuable contributions can be made to the food industry in both of these fields.

Measuring applications of ultrasonic waves include the detection of flaws, the measurement of the thickness of equipment, continuous determination of fluid viscosity, and the measurement of fluid-flow rates. Each of these functions can be carried out without interrupting the operation and without withdrawing samples from the process stream.

Potential uses.--Ultrasonics offers several effects that can be put to advantageous use in the food processing industries. These effects fall into four broad classifications: (1) dispersive, including the production of emulsions and dispersions and cleaning effect; (2) flocculative, including coagulation and degassing; (3) chemical, including the degradation of proteins and polysaccharides; and (4) biological, chiefly the sterilization of foods.

Other means than ultrasonics can also be used to achieve these same effects. The use of ultrasonics has been held up by economic considerations. The technology of ultrasonic waves, however, is progressing in the direction of lower power cost, more moderate unit investment, and lower maintenance costs so that ultrasonics is becoming more competitive. In some instances, ultrasonics produces a better-quality product that warrants the higher costs.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

0.12 LIGHTING FOR COMMERCIAL FISHING PLANTS

Anonymous (Lighting Institute Lamp Department, Canadian General Electric Co., Ltd., Toronto)
Canadian Fisherman 46, 28, 30, 32-33 (August 1959)

Fundamentals of good lighting.--Two basic factors are involved in the fundamentals of good lighting--quality and quantity of light. Quality involves three major factors: (1) minimum glare, (2) soft shadows, and (3) low brightness ratios.

Glare, which is a common fault of our lighting systems, may arise from the use of bare bulbs in the direct line of vision. Even fluorescent light can be uncomfortably bright if the tubes are unshielded and are mounted too low. Glare can be minimized by carefully positioning the light sources, by using proper shielding, and by using light-colored surroundings.

Shadows in the work area should be soft and not harsh or annoying. Minimizing shadows involves using enough lights to ensure getting light from a number of directions at a specific work point.

Adjacent areas of brightness and darkness can cause strain that is similar to the strain caused by glare. Light-colored surroundings such as white ceilings and pastel walls greatly aid in the reduction of brightness contrasts.

Benefits of good lighting.-- The following benefits may be expected to result from good lighting: (1) increased production, (2) less spoilage, (3) better quality of product, (4) less eyestrain and fatigue, (5) better morale of workers, (6) improved cleanliness and orderliness throughout the plant, (7) maximum use of available floor space, and (8) safer working conditions.

Guide to proper lighting.--The following tabulation may be used as a guide in the selection of foot-candle level for a specific work area:

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.112 UNDERWATER TV AND THE FISHERIES (I)

Russell, Jay
World Fishing 8, 40-43 (June 1959)

Underwater television (UTV) is such an attention-getter that its role in marine work easily can become over-dramatized. UTV is a unique tool that can perform jobs that no other tool can do, however, it does have definite limitations.

UTV is versatile and has been used in such varied pursuits as looking for sunken treasure, searching for wrecked aircraft, surveying for marine engineering projects, and studying the underwater aspects of various fisheries. The variety of fishing gear that have been observed include scallop drags, otter trawls, midwater trawls, gill nets, and fish and lobster traps.

In the clear waters of Florida, midwater trawls were studied from the front and side with a UTV camera. The critical part of this operation was directing the camera. Two different towing vehicles were used to carry the camera: one with preset steering controls for watching the side of the net and another with remote controls that could be operated from the vessel for watching the front of the net. Neither camera worked very well, but some observations were permitted. These revealed some defects in the trawl, and alterations were made that appear to improve its operation.

UTV was used in a study of lobster trap operations off Yarmouth, Nova Scotia, in a project designed to improve aluminum and steel traps. The following is an excerpt from the official report: "Lobsters were seen crawling on sand and gravel bottom, although it had been previously assumed that they lived only on rocky bottom. Again, local fishermen were quite sure that some lobsters escaped from traps, but no escape was noted in a trap containing seven lobsters over a period of 6 hours, during which four entered the secure end of the trap from which escape is virtually impossible."

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 ABSTRACTER: Kathryn L. Osterhaug

2.112 UNDERWATER TV AND THE FISHERIES (II)

Russell, Jay
World Fishing 8, 50-54 (August 1959)

In this article, the author evaluates the potential of underwater television (UTV) and discusses its place in the marine research of the future.

The two greatest limitations in the operation of UTV are (1) the difficulties in directing and positioning the camera and (2) the restrictive effect of the bulky camera cable.

Neither of these limitations is serious when working with otter trawls. The net, which is rigid when in action, provides a solid platform to which the camera can be attached. With the length of the cable limited to 1,000 feet, the camera can be used to depths of over 60 feet during trawling operations.

Visibility restrictions are the only serious limitations when working with otter trawls. Visibility range is affected by turbidity and illumination. Turbidity results from organic or physical matter in suspension. Illumination is primarily affected by the relative position of the sun and by the depth of the water.

Under poor illumination conditions, artificial lights may be used. Standard underwater lights rated at 1,000 watts are readily available. These lights are satisfactory for viewing objects that are near the camera but are almost useless for more distant objects. The effect obtained with artificial light under water is similar to that obtained by shining a light through fog.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

ULTRASONICS FOR FOOD PROCESSING

LIGHTING FOR FISH PLANTS

UNDERWATER TELEVISION

UNDERWATER TELEVISION

0.12

Minimum number of food candles on the task

Canning and preserving		Inspection	
Initial grading raw material samples	50	Rough	50
Color grading (cutting rooms)	200	Medium	100
Preliminary sorting	50-150	Fine	500
Cutting, pitting, final sorting	100		
		Materials handling	
Canning		Wrapping, packing, labelling	50
Continuous belt and sink canning	100	Classifying	30
Hand packing	50	Loading, trucking	20
Examination of canned samples	200	Service space	
		Stairways	20
Container handling		Corridors	20
Inspection	200	Toilets and washrooms	30
Can unscramblers	70		
Labelling and cartoning	30	Storage rooms and warehouses	
		Inactive	5
Chemical laboratory	50	Active	
		Rough, bulky	10
Garages		Medium	20
Repairs	100	Fine	50
Active traffic areas	20		
Storage	5		

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Almost any moving gear could be examined by UTV as easily as the otter trawl. Each type of gear would present special problems, but not insurmountable ones.

Observations of nonmoving gear with UTV are simpler in some respects but more difficult in others than is the observation of otter trawl gear. The large physical area covered by gear such as long lines, gill nets, and trap leads will require that the camera be mounted on a vehicle that will allow freedom of movement.

The problem involved in the observation of lobster traps is the relatively long waiting period required in order to observe a brief moment of action.

UTV as part of gear.--What future does UTV have as a part of commercial fishing gear? A simple UTV camera might, for instance, be mounted in the cod end of a trawl to monitor the catches. By this means, the skipper would know at all times the amount of fish in the catch. He could adjust the depth or direction of trawling to obtain the maximum concentration of fish.

How practical would this be? A UTV outfit for such a purpose would be no more costly than a radar set. A small control unit and a length of connecting cable would probably complete the "chain" at a cost estimated at less than $3,500.

Summary.--Underwater television will come into its own when it is used as a primary tool of well-equipped research and development centers where long-range programs are carried out.

0.12

Present commercial applications of ultrasonic waves are chiefly concerned with the dispersive function. Ultrasonics is capable of producing emulsions that are characterized by uniquely small and uniform size of particle. The resulting dispersions and emulsions are smooth and may be rapidly produced.

Advantages of ultrasonics.--The chief value of ultrasonic waves to the food industry rests in three key characteristics: (1) they can be focussed, thus permitting rapid local application of high energy; (2) they can be controlled over a wide range; and (3) they can be used without introducing possible sources of contamination into the process stream. It is in situations where these properties are needed and useful that the food processor may find ultrasonic waves effective and economically justifiable.

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Otter trawl study.--In preliminary studies of the operation of the front part of an otter trawl net in New England waters, the camera was slung from the upper belly to provide a view of the headline, groundline, and one wing of the net.

The headline appeared to rise at least 8 feet from the bottom at a towing speed of about $3\frac{1}{2}$ knots. The headline, 78 feet in length, was floated by 10 Phillips trawl-plane floats along the square and 6 standard spherical floats at each wing.

The groundline tended bottom very well, occasionally knocking the tops off sand ripples and sending up clouds of sand. The groundline rose up well to slide over occasional boulders that protruded 30 inches or more from the bottom.

Haddock, whiting, dogfish, flounders, anglers, and other species were watched as they were scooped up by the net. On one tow, the effect of a malfunctioning of the net was studied; this was caused by a quarter rope snarling a float. Nothing resulted from this limited study, however, which will effect an improvement in trawl design.

In one interesting experiment carried out by German researchers, the visibility of cotton and synthetic gill nets was tested with UTV. In "shallow" water the synthetic twine was shown to be somewhat less visible than cotton, but at "medium" and "deep" levels the synthetic twine was nearly invisible, whereas the cotton could be quite easily seen.

2.1123 LIVE BAIT TUNA GEAR FOR SMALLER VESSELS

Lorimer, P. D. (Fisheries Division, Dept. of Primary Industry, Canberra, Australia)
Fisheries Newsletter (Australia) 18, 13, 15, 17 (July 1959)

Live bait tanks. -- The size of a bait tank is limited by the size of the vessel. Great care must be taken to ensure that the weight of the water in the bait tank does not raise the center of gravity to such an extent that the vessel becomes unstable and therefore dangerously unseaworthy. Tanks should be positioned to give the vessel the most suitable trim for fishing. For maximum stability, the bait tank should be placed so that as much of it as possible is below deck level. Ideally, only the hatch coaming should project above the deck. The hatch coaming should be high enough so that the water still fills the hatch when the vessel is rolling heavily.

The tank and hatch coaming can be constructed of steel, timber, or heavy, waterproof plywood. The simplest form of inlet for the water supply consists of a pipe with a series of holes drilled in it and blocked off at the end. The holes should be big enough to allow the water to flow in evenly without causing excessive swirl. The outlet or overflow pipe should be situated well up on the overboard side of the hatch coaming, should have at least twice the diameter of the inlet pipe, and should be backed on the inside of the coaming with a screen.

Allowance must be made for suitable lighting to prevent the bait from panicking and dying. The inside of the tank is painted white, and lights are placed in the tank for night illumination. With a heavy concentration of bait in the tank, the lights should be left on continually.

The pump should be placed below the waterline of the vessel so that it is self-priming. The sea inlet should be well down towards the keel and within the midship section of the vessel. It is important that no air at all be sucked through the pump. The capacity of the pump should be sufficient to fill the tank in 10 minutes or less and to change the water completely in 7 to 10 minutes. A simple

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ABSTRACTER: Kathryn L. Osterhaug

2.114 HYDRAULIC WINCHES

Anonymous
France peche 3, No. 19, p. 23 (June 1958) (In French)
World Fisheries Abstracts 10, 5-6 (January-February 1959)

In trawling for fish, many types of winches have been used: steam-operated, mechanical through a transmission from the shaft by belt, gear or chain, and electric. Each has both advantages and disadvantages. The latest development is the hydraulic winch characterized by even and smooth operation, easy control and great flexibility. With a hydraulic winch, the acceleration is five times higher than with an electric motor, and the top speed is reached 60 percent faster.

The principle is: a pump in the engine room is driven by the main engine, and sends a flow of oil to the winch through piping, the flow being regulated by a valve to obtain the required speed. The oil returns to the pump through the suction pipe and is recirculated. To avoid the changes of volume due to variations of temperature, there is an overflow tank placed over the higher point of the system. A pressure gauge inserted on the discharge side of the pump indicates the oil pressure, and by this the load on the warps can be determined. A safety valve protects against overloading.

Another combination is widely used in Norway. The main engine and the auxiliary engine drive two separate pumps. Both discharge pipes are coupled to the pipe leading to the winch. The capstan for fishing is connected to the same piping and controlled by means of a valve on the return pipe of the winch that is connected in series to the capstan. The discharge pipes of the pumps being parallel, it is possible to obtain a double speed for hoisting, both pumps running simultaneously.

The pump is mounted over a cast iron plate fixed on a bed; it discharges oil at 25 to 28 kg. per cm.^{2} (355.5 to 398.2 lb. per sq. in.) pressure, at full load on the winch. This low pressure is

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ABSTRACTER: Jacques Chaux

2.114 THE OUTBOARD GOES COMMERCIAL

Anonymous
Canadian Fisherman 46, 23-24, 26 (August 1959)

Florida mullet skiff. --In many areas of the world, large catches of fish may be made close to the fisherman's base of operations. A small boat suitable for gillnetting in placid waters is needed for fishing under these conditions. The Florida mullet skiff is such a boat. Mullet skiffs are built with planking of sheet plywood, are about 20 feet in length, and have a beam of almost 7 feet at the transom. Their depth usually is less than 2 feet. Because a clear working space is required aft, the motor usually is mounted elsewhere. The mounting well shown in the drawing (see over) permits the operator to both steer and pivot the motor. The motor usually is tilted up when not in use so that it will not become fouled.

In normal operations, the 1- or 2-man crew sit forward. The boats run well whether loaded or light. The weight of the bare boat is 660 pounds. With a 10 h.p. motor, fuel containers, and a 2-man crew, the boat displaces more than 1100 pounds. The speed at this displacement is 10.3 knots, which decreases to 4.0 knots when more than 1300 pounds of gear and catch are added. The most popular power range for the Florida mullet gillnet skiff is from 12 to 20 h.p. An 18-h.p. motor permits speeds of 10.7 knots when light and over 4.9 knots with a half ton of catch on board. These figures are for speeds when a standard propellor is used; fishermen that equip their engines with lower pitch propellors increase their speed from 10 to 15 percent.

River gillnet tender. --A craft similar to the Florida mullet skiff has been evolved for use as a river gillnet tender. In tidal rivers, gillnets are placed on poles driven into the river bed. The nets are below the surface at high tide, and they often are at the surface at low tide. The tidal flow often

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ABSTRACTER: Kathryn L. Osterhaug

2.15 PROBLEMS AND TRENDS IN THE FISH INDUSTRY--I.

Cutting, C. L.
Food Manufacture 34, 281-283 (July 1959)

Introduction. --The British fishing industry appears to be entering into a phase of rapid development. If fish is to withstand competition from foodstuffs produced under more rationalized conditions, the industry may have to change its traditional methods and attitude. In Britain the total weekly purchase of fish amounts to only 6 ounces per person as compared with nearly 3 pounds of meat per person. Fish probably could drop right out of the diet of many people without causing them concern. However, fish is an unrivalled delicacy if it is properly preserved and prepared. To produce uniformly good fish, the industry must give greater attention to handling conditions from catching through retailing.

Inherent difficulties. --Lack of control over supplies from day to day and rapid spoilage are factors that combine to make a difficult situation for fish processors who strive to arrange for a steady throughput of fish of consistently good quality. Prices at first sale fluctuate violently in response to the variation in day-to-day supply and demand. The fish industry during the past 100 years has developed (1) the use of ice to cool the fish and thus retard spoilage from the growth of bacteria, (2) speed in handling at the port and in transit to consumer areas, and (3) a rough-and-ready although discriminating method of quality assessment based almost entirely on rapid subjective assessment of external appearance.

Purpose. --The present article attempts to analyze the position of the fish industry, its problems, needed improvements, and possible future trends.

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ABSTRACTER: Martin Heerdt

FISHING FOR TUNA

OUTBOARD FISHING BOATS

HYDRAULIC WINCHES

HANDLING AT SEA

2.114

approaches 2.5 to 3.3 knots. The boats are generally of the lapstrake type with a simple motor-well about 6 feet from the stern, which is suitable for use in deep water where there is no need to tilt the outboard.

The novel feature of the river gillnet tender is the use of a cylindrical mounting well of heavy gauge pipe. The motor is placed in the well and clamped on. The operator sits on the thwart forward of the motor and operates the throttle and reverse gear while facing aft so that he can observe the net handlers.

Oyster garvey.--Chapelle (1955) has written that he thinks the future of the outboard in the commercial fisheries lies in the heavy-duty motor fitted to larger boats. The oyster garvey is such a boat.

A feature of this craft is the use of twin skegs to provide protection against grounding and to make it easy to beach and launch the boat. The motor is mounted on a heavy cross-framed bulkhead near the stern and projects through the bottom between the skegs. The transom is cut out to permit easy afterflow of the wake and to permit the escape of exhaust fumes from the bypass without contamination of the air taken in by the carburetor. A 25-h.p. motor generally is used in such a craft, and speeds of 12.4 to 14 knots are reported under light-load conditions.

Other fishing boats using outboard motors include salmon net tenders and salmon trolling dories in the Pacific Northwest and Alaska and New England lobster boats.

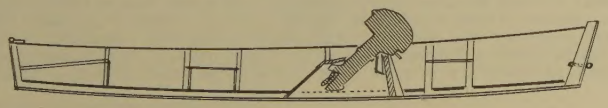

Figure 1.-A cross-section drawing of the Florida mullet gillnet skiff

2.15

Maintenance of quality.--A large part of the time involved in the distribution of the fish is that during which the fish are on the fishing vessel; therefore, it is imperative to maintain the fish at the lowest possible temperature short of freezing. Trawlers, which land most of the white fish (cod, haddock, and plaice), are able to provide temperatures in the range 30° to 31° F. if the fish are properly stored in crushed ice. About 50 percent of the white fish come from fishing grounds off the coasts of Iceland, Norway, Russia, Spitzbergen, and Greenland. The average return trip from these grounds requires 5 days, whereas the round trip usually requires 20 to 21 days. An average landing contains fish that have been stowed in ice for periods varying from 5 to 15 days, and only if the first-caught fish are well cleaned and properly iced will they be fit to eat on being landed.

Icing problems.--Fish caught at the end of the trip usually are laid out on beds of ice on shelves, one fish deep, without ice on top. The appearance of shelved fish is more attractive than that of bulked fish; however, the appearance of shelved fish does not remain discernible for long once it enters the distribution chain. Shelved fish often are stored at a slightly higher temperature than are fish stored in bulk in ice, so at times, the shelved fish may be less fresh than are fish stored in ice. The ordinary practice of icing fish in 3-foot layers with crushed ice definitely marks the fish with indentations and causes shrinkage with an attendant loss in weight. Shallow storage in crushed ice would produce better results with no more labor. The practice of icing in boxes at sea also improves the retention of quality, but this involves extra labor and requires additional space for storing empty boxes.

Future developments.--A machine for gutting fish and a machine for facilitating icing are potential future developments that may have to be accommodated on fishing vessels. Storing fish at sea in refrigerated sea water in place of crushed ice also appears to have merit according to Canadian research workers.

2.1123

pump system consists of a sea inlet, sea cock, pump, delivery cock, and delivery line to the tank. A system that is more suitable for larger vessels is illustrated in figure 3 (see below).

Fishing racks.--The general practice is to fit a rack across the end of the boat. To supplement this stationary rack, some vessels use one-man movable racks that hang over the rail and are supported by the side of the vessel. Racks usually are constructed of galvanized iron pipe with one rail at knee height and another about 3 inches above the floor.

Chumming gear.--Two small, shallow, short-handled scoops of $\frac{1}{2}$-inch mesh are used for chumming. A crowder is used to catch some of the bait in the tank and confine it to a smaller area so that it can be readily picked up in the chumming scoop.

Pole gear.--The poles are of Japanese bamboo 8 to 10 feet long and 2 inches in diameter at the butt and tapered towards the tip. They are sized and bound with adhesive tape between the knots to prevent splitting. The gear is rigged as shown in figure 4 (see below).

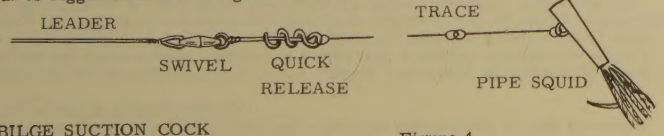

Figure 4

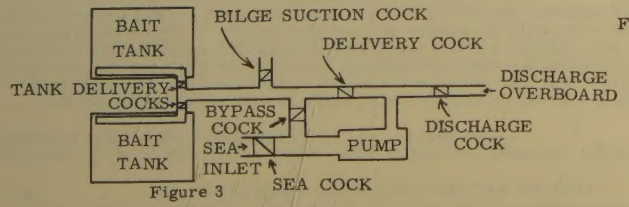

Figure 3

2.114

selected because of the low cost for making the equipment and to avoid absorption of air. There is a friction clutch or a flexible coupling between the engine and the pump.

To provide the necessary power there are one or many engines on the winch. The types used in France are: one engine for a 3.5-ton pull (trawler of 26 m. [85.3 ft.] about); two engines for a 5.5-ton pull (30 to 34 m. [98.4 to 111.5 ft.] long trawlers); three engines for a 6.5- to 7-ton pull; and four engines for a 10-ton pull. The hydraulic engines are coupled directly to the drum. The engine is composed of three chambers, the oil being distributed to the different ducts by means of a slide valve controlled by a wheel. The flow of oil is constant, only the pressure varies according to the load. In rough sea, the pull varies on the warps but the pressure of oil will be self-adjusted automatically and the pull on the warp is constant. The slide valve includes an automatic valve sensitive to the speed of the flow.

The other types of winch include: line haulers, used mostly for tuna fishing; windlasses for 16 to 57 mm. (5/8 to $2\frac{1}{4}$ in.) chains; cargo handling winches for 1.5, 2, 2.5, 3, and 5 tons; capstans for 1 to 6 tons, and special winches for dredges, etc.

2.143 THE ELECTRODES AND THEIR ARRANGEMENT IN ELECTROFISHING

Hattop, H. W.
Deutsche Fischerei Zeitung 5, p. 148 (May 1958) (In German)
World Fisheries Abstracts 10, 17-18 (March-April 1959)

Form and arrangement of the electrodes in electrofishing are often inefficient because their effect is not properly recognized. The electrical field formed in the water is not restricted to the area between the two electrodes. The lines of force emerge from all sides of the electrodes. The lines of force lose their straight direction and bend towards the oppositely charged electrode only at a fairly long distance from the electrode. The real fishing area is the circular space around the catching electrode. The electrical field is limited to the area between the electrodes only where short distances (smaller than 3 m. [9.8 ft.]) are concerned. In this case the field between the electrodes is particularly effective. In practice, this arrangement cannot always be attained. Quick movements are often necessary, and with too small a distance between the electrodes, contacts and short circuits may occur.

A specific arrangement of the electrodes is recommended. If the negative electrode is of the correct size, it is possible to fish up to a distance of 1 km., if the gear is placed on the beach. If fishing is to be done from the boat, this problem does not exist. In this case, it is suggested that the negative electrode be attached to the outer hull of the boat or made to slide over the bottom.

The size of the electrodes and their proportions are important. The fishing electrode is suspended in the water about 1 m. (3.2 ft.) deep. As negative electrode, a wire of 3 to 6 m. (9.8 to 19.6 ft.) long and 3 to 4 mm. (1/8 to 5/32 in.) thick, with the current on, is slowly put into the water until the strength of current desired for fishing, measured in amps., is reached. If this current strength is not reached, the fishing electrode must be enlarged and a generator unit of greater

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 ABSTRACTER: A von Brandt

3.12 USE OF POTASSIUM AND SODIUM SORBATE IN EXTENDING SHELF-LIFE OF SMOKED FISH

Geminder, J. J. (Chas. Pfizer and Co., Inc., Brooklyn, New York)
Food Technology 13, 459-461 (August 1959)

Introduction. --Dried, salted, or smoked fish are susceptible to mold and yeast growth. Despite proper plant sanitation and reduced storage temperatures, mold and yeast growth causes large economic losses. A red mold, Sporendonema epizoum, with the common name of dun mold causes considerable damage to salted fish. Boyd and Tarr reported that the development of dun was markedly inhibited in fish that had been dry salted with salt containing 0.05 to 0.4 percent sorbic acid. Inhibition of yeast and mold growth was also accomplished when fish were dipped in brine solutions containing 0.5 to 1.0 percent sorbic acid before they were smoked. Sorbic acid has a low order of toxicity.

Purpose. -- This study was made to evaluate the use of a commercial level of sorbic acid on smoked fish. Potassium and sodium sorbate were used because their water solubility is superior to that of sorbic acid, and they are approximately equal to sorbic acid in antimycotic activity. The acid surface of fish converts potassium or sodium sorbate to active sorbic acid.

A preliminary study showed that an instantaneous presmoke dip or presmoke spray of a 5-percent solution of potassium or sodium sorbate deposited levels of 0.04 to 0.05 percent sorbic acid on whitefish and salmon. Sorbic acid resisted decomposition in the heat produced during the smoking process in a nonventilated smokehouse. Yeast and mold growth were inhibited in treated fish stored at 40° F. Mold growth was also inhibited in chubs dipped after smoking in a 5-percent solution of potassium sorbate.

Experimental. -- Whole, gutted chubs, sablefish fillet pieces, herring in the round, and whole,

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 ABSTRACTER: Martin Heerdt

2.19 CHANGES IN THE LIPIDS OF COD DURING STORAGE IN ICE

Lovern, J. A.; Olley, June; and Watson, Helen A. (Torry Research Station, Aberdeen, Scotland)
Journal of the Science of Food and Agriculture 10, 327-337 (June 1959)

Introduction. --The flesh of the cod (Gadus callarias) contains about 0.6 percent of total lipids. True fat (triglyceride) shows significant seasonal variations which amount to only 2 or 3 percent of the total oils. Lecithin represents about 35 percent of the total. About 5 percent of free fatty acids are present.

Purpose. --The effect of storage in ice on the lipids of cod flesh was studied to provide basic information about the lipids. Preliminary work suggested that the experimental storage period in this study should be extended considerably beyond the limits of commercial practice.

Extraction of total lipids. -- Cod for these experiments were iced at sea in the usual way immediately after being caught, repacked in crushed ice at the laboratory, stored in boxes in a chill room at 2° C., reiced as necessary, and assayed within 24 hours after catching. For each experimental series, enough fish of uniform size were obtained to permit withdrawal of three fish at each time interval. Skinless fillets were cut from the three fish, minced, and well mixed. A 1-kilogram (kg.) sample was used for extraction.

In the first storage experiment, the minced flesh was extracted consecutively with acetone and with ethanol-ether 3 to 1, and a crude lipid extract was obtained. This extract was transferred to chloroform-methanol 2 to 1 and purified by the washing procedure of Folch et al. (1951). In subsequent experiments, the minced flesh was extracted once with 500 milliliters (ml.) of acetone at room temperature to remove considerable water and then with three consecutive batches of 900 ml. each

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 ABSTRACTER: Martin Heerdt

3.64 THE EFFECT OF DRYING AND STORAGE IN THE DRIED STATE ON SOME PROPERTIES OF THE PROTEINS OF FOOD

Connell, J. J. (Torry Research Station, Aberdeen, Scotland)
Fundamental Aspects of the Dehydration of Foodstuffs, 1958, The Society of Chemical Industry, London, England, pp. 167-177 (Reprinted)
Torry Memoir No. 3 (1959)

In addition to their nutritional significance, proteins play an important role by imparting characteristic physical properties to many foods. In flesh foods such as meat and fish, proteins constitute the chief structural components. Proteins in foods such as eggs, milk, and gelatin are responsible for such important properties as capacity to gel, coagulate, thicken, emulsify, and foam. Any impairment of these desirable properties and the consequent reduction in food quality often can be attributed to alterations in the protein. The problem of retaining acceptable eating quality in proteinaceous food, particularly in regard to texture, is essentially the problem of stabilizing protein.

Food-drying processes are capable of impairing quality through their effect on proteins. The difficulty of drying proteinaceous foods has stimulated considerable research into improved methods of drying by lessening the destructive effects of heat. Warm-air tunnel drying has been used successfully for the drying of precooked meat and fish minces, but this method has not been found desirable for whole pieces of flesh. For the latter, vacuum processes and freeze-drying are being explored.

Despite many improvements in drying techniques, most dried products still are short of fulfilling the ideal requirements of being indistinguishable from the starting material after reconstitution.

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 ABSTRACTER: Kathryn L. Osterhaug

ELECTRODES FOR ELECTROFISHING

LIPID CHANGES IN COD IN ICE

SORBIC ACID PRESERVES SMOKED FISH

EFFECT OF DRYING ON PROTEIN

2.19

of chloroform-methanol 2 to 1. The lipid extract was submitted directly to the procedure of Folch et al. without any reduction in volume.

Determination of free fatty acids.--In the first storage experiment, the lipids were chromatographed on silica gel and activated at 120° C. for 4 hours. The activation treatment permitted the phospholipids dissolved in light petroleum to pass through unadsorbed, whereas the neutral fat, free fatty acids, and sterol were retained. The nonphosphorylated lipids were then eluted with ethyl ether, and the free fatty acids were recovered when the nonphosphorylated lipids were washed with aqueous alkali. In the second storage experiment, the component lipids were chromatographed on a different type of silicic acid to effect a more detailed separation.

Determination of other compounds presented.--Cholesterol, free and esterified; ester groups; phosphorus; total nitrogen; and choline, ethanolamine, serine, and inositol also were determined.

Results.--The outstanding changes are hydrolysis of phospholipids with concomitant production of free fatty acids and progressive esterification of free cholesterol. The hydrolysis takes place without accumulation of such intermediates as lysophosphatides, phosphatidic acids, or diglycerides; but the esterification shows evidence of some intermediate between free and esterified sterol. Lecithin and phosphatidyl ethanolamine are hydrolyzed at the same rate. Initial rates of change, which are relatively low, become markedly greater after about 2 weeks of storage in ice, but they practically cease abruptly before complete conversion has occurred. After about 5 weeks, when some 70 percent of the phospholipids have been hydrolyzed, further breakdown does not occur. The chemical composition of the phospholipids does not alter significantly at any time. The sterol transformations are practically over after 6 weeks of storage in ice, at which time 85 percent of the sterol is in the esterified form. The only definite destruction of lipid occurred after about 5 weeks of storage and consisted of the destruction of free fatty acids in one experiment.

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Another problem related to successful drying is that of arresting deterioration during storage. The texture of dehydrated fish, for example, quickly becomes dryer and tougher after only moderate storage.

The mechanisms by which proteins are altered during drying probably are different in some respects from those that occur during storage, but present knowledge does not allow them to be discussed separately.

The principle agent involved in protein alteration is heat. During drying, the concentration of such tissue components as inorganic salts may rise to a level that is damaging to the protein. The translocation of potassium in the cell during drying has been proposed as one of the factors causing denaturation. Preliminary experiments have suggested that the development of toughness and the decrease in ability to swell that take place during the storage of dehydrated fish are factors that may be correlated with decreases in the solubility of the protein. Of the the many possible mechanisms that lead to insolubilization, only two are supported by experimental evidence: (1) "browning" reactions and (2) the interaction of denatured protein molecules.

Even freeze-dried fish fillets, which are the best product so far examined, are noticeably tougher and drier in texture after reconstitution than are fresh fish. In the dried fish, the protein gel system of the fresh fish is disorganized even though the microscopical appearance of the muscle cell is unchanged. The true water-binding capacity of the proteins is, for example, greatly reduced. The solubility of the proteins of freshly prepared dehydrated fish in 0.5 M-potassium chloride pH 7.0, as determined by a standard technique, is very much less than that of the proteins of fresh fish, and this fact, together with a reduced ATP-ase activity, indicates that the main structural protein complex of muscle, actomyosin, has been denatured on drying. This is not surprising, since actomyosin is one of the most unstable proteins known.

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voltage used. In fresh water, negative electrodes of 1 to 3 m. (3.2 to 9.8 ft.) will usually be sufficient for voltages of between 400 and 500; with strong water pollution, few cm. will do, for which low voltages (100 to 200) are recommended. When the length is ascertained, a strip of aluminum plate of about 1 cm. (13/32 in.) wide is cut and fastened to the boat, or a chain of the same length through which a braided copper wire of 2 mm. (3/32 in.) thick is drawn.

The hand-shaped electrode is better than the plate-shaped. The catching electrode must be particularly portable and easy to handle. The best would be a flat, round, dish-shaped electrode consisting of a strong wire hoop (about 30 to 40 mm. in diam. [1-3/16 to 1-9/16 in.]) with transverse bracing covered with a piece of webbing (mesh size 20 mm. = 25/32 in.) of monofilament Perlon, which should be used only for attracting the fish--not for catching them. It is unnecessary to use copper; iron and aluminum work as well. Rust does not matter.

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gutted whiting were sprayed with a 10 percent weight-to-volume solution of sodium sorbate after they had been smoked. In addition, a solution containing 10 percent sodium sorbate and 5 percent sodium erythorbate (sodium isoascorbate), an antioxidant, was sprayed onto smoked salmon sides. This spray deposited approximately 0.10 percent sodium sorbate per pound of fish for each 5 milliliters of 10-percent solution passed through the spray nozzle. All fish were sprayed on smoking trees immediately after removal from the smokehouse. Untreated controls were selected for comparison from similar lots of smoked fish.

Treated and control samples were vacuum packed in Mylar pouches and heat sealed. Alternate pouches of each of the treated and control samples were punctured with a pin to release the vacuum and to simulate accidental puncture of the pouches in transit as caused by sharp fish fins. All samples were stored at 40° F. to simulate actual shipping and retailing conditions. Visual examinations were made periodically to determine yeast and mold growth.

Results.--Ten-percent solutions of sodium sorbate sprayed on whole fish, gutted fish, or fish fillets were successful in inhibiting yeast and mold growth. These solutions deposited approximately 0.05 to 0.15 percent sorbic acid by weight on the smoked fish. Generally, this level of sorbic acid doubled the shelf-life of smoked fish packed in punctured vacuum pouches. The solution, containing 10 percent sodium sorbate and 5 percent sodium erythorbate applied as a spray after smoking, aided in retaining the typical salmon pink-red color. However, a better color retention was obtained if a presmoke dip was used.

Discussion.--Antimycotics can be applied as a pre- or postsmoking treatment in the form of a dip or spray. Sorbic acid will not volatilize appreciably at normal smokehouse temperature. Optimum concentrations of solution range between 5 and 10 percent for dip or spray applications. Shelf-life extensions, reduced returns, and extended lines of distribution should more than compensate for the cost of the addition of sodium or potassium sorbate to smoked fish products.

2.1474 FISH TRAPS IN FRESH-WATER FISHERIES

Breitenstein, W.
Zeitschrift fur Fischerei 5, p. 443 (April 1957) (Neumann-Verlag, Radebeul, Dresden, E. Germany) (In German)
World Fisheries Abstracts 10, 13-14 (January-February 1959)

Fishing with traps is very important in the Central European fishing industry. Up to 75 percent of the total catch may be taken by traps in some lakes. Nevertheless, many questions concerning classification, manufacture and standardization have not as yet been answered. There exist three basic types: double entry traps of cylindrical shape and with two entrances, fyke nets and basket traps. These basic forms can be provided with wings in various ways, thus developing distinct specific types of traps with typical names. Variations in the different areas develop depending on the local conditions. Unfortunately, wrong principles are often considered for traditional reasons, when making the gear. The construction of the gear could be improved by reducing the amount of material, by saving time and by increasing the efficiency. The construction of the main types of traps is thoroughly described in detail, giving calculations and drawings. The rings are made of twigs of soft wood, young osiers (willow) or wire. The necessary parts of the net are obtained by cutting them into the desired shape. Based on the methods of making traps in various areas, the working time, wages and consumption of material are investigated. According to these investigations the total costs in the individual fishing enterprises may be three times the amount where compared to others owing to irrational working methods. Suggestions are made regarding placing of the traps during operation. Mesh sizes, thickness of twine, material, proportion of size of the several parts, construction of entrance, assembly, preservation (softness) and sometimes the color of the net are essential for the efficiency of the gear. Attempts should therefore be made to keep the swell of fyke nets, which might be felt by an approaching fish, as little as possible. This is done by having larger meshes at the opening. Fyke nets made of Perlon are more efficient than those made of cotton treated by

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ABSTRACTER: A. von Brandt

4.11 IDENTIFICATION OF OILS AND THE DETECTION OF OIL ADULTERATION BY DIFFERENTIAL INFRARED SPECTROSCOPY

Bartlett, J. G. and Mahon, J. H. (Food and Drug Directorate, Department of National Health and Welfare, Ottawa, Ontario, Canada)
Journal of the Association of Official Agriculture Chemists 41, 450-459 (1958) (Reprinted)

Purpose.--Chemical tests for the detection of rapeseed oil in olive oil are too time-consuming. Infrared spectroscopy, which has been widely used for the rapid identification of organic compounds, has not been used to identify edible oils because edible oils have very similar spectra. In 1954, Stewart was able to differentiate between fats by differential infrared spectroscopy. In preliminary studies, the spectra of rapeseed and olive oils were found to be similar, but minor differences appeared in plots of the data, particularly in the region of 1200 to 900 cm.$^{-1}$. To emphasize these differences, the technique of differential infrared-spectroscopy was tried.

Procedure.--Weigh 2.50 grams of an oil sample into a 25-milliliter volumetric flask and dilute to volume with carbon tetrachloride. Prepare for reference a similar 10-percent weight-to-volume solution of olive oil of known purity. Fill two 0.5-millimeter sodium chloride cells with the reference oil solution and place them in a double-beam infrared spectrometer. Operating conditions used with a Perkin-Elmer Model 21 infrared spectrophotometer were as follows: slit, 300 microns (fixed); response, 1:1; gain, 4.8 to 5.2; filter out; frequency range, 1200 to 900 cm.$^{-1}$; prism, sodium chloride; source current, 0.3 amperes; and beam trimmer balance, to give a reading of approximately 75 percent transmission. Under the above conditions, obtain a tracing that will be a measure of the alignment of the instrument and the matching of the cells. This is referred to as the reference line. Rinse and fill the sample-beam cell with the solution of the oil to be examined, and repeat the recording over the same wave length region without changing the setting of the instrument or the chart paper.

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ABSTRACTER: Martin Heerdt

4.11 THE ANALYSIS OF FATTY ACID MIXTURES BY GAS-LIQUID CHROMATOGRAPHY: CONSTRUCTION AND OPERATION OF AN IONIZATION CHAMBER INSTRUMENT

Farquhar, John W.; Insull, William, Jr.; Rosen, Paul; Stoffel, Wilhelm; Ahrens, Edward H., Jr. (The Rockefeller Institute, New York 21, New York)
Nutrition Reviews 17, Part II, 1-30 (August 1959)

Introduction.--The purpose of this publication is to describe the application of gas-liquid chromatography (GLC) to the analysis of complex mixtures of fatty acids ranging in length from C_3 to C_{24} and, in addition, to provide details on the construction and operation of an exceedingly sensitive and dependable apparatus for GLC.

General principle of detection devices.--Gas-liquid chromatography is an outgrowth of the development of liquid-liquid chromatography and is closely analogous in principle. Compounds that are volatile at the temperature of the column are distributed between a moving gas phase and a stationary liquid phase. The latter is supported in the column on a porous bed of nonreactive material. Differences in partition coefficients cause the volatile compounds to move through the column at different rates. By means of a suitable detection system, the concentration of eluate in the effluent gas is plotted against time. Extremely effective separations of highly complex mixtures can be made by utilizing various stationary phases and column temperatures in successive chromatographic runs. Rapid progress has been made in designing detection devices of increasing sensitivity and dependability. One of the first was the ingenious gas-density balance of Martin and James (1956). The enormous sensitivity of the ionization chamber developed in 1958 by Lovelock made possible the advantages of high column efficiencies in the resolution of structurally similar compounds.

In principle, the ionization chamber can be used to detect changes caused by the entrance of

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ABSTRACTER: Martin Heerdt

4.20 GAS-LIQUID CHROMATOGRAPHY OF FATTY DERIVATIVES. II. ANALYSIS OF FATTY ALCOHOL MIXTURES BY GAS-LIQUID CHROMATOGRAPHY

Link, W. E.; Hickman, H. M.; and Morrissette, R. A.
Journal of the American Oil Chemists' Society 36, 300-303 (July 1959)

In a previous paper, saturated fatty alcohols were reported to be separated by means of gas-liquid chromatography, using either silicone grease or carbowax 4,000 monostearate as the partitioning agent and C-22 firebrick as the inert support. Analysis of mixed saturated and unsaturated components in alcohols derived from soybean and linseed oil was only partially successful because of the incomplete separation of the unsaturated alcohols.

The analysis of mixtures of saturated and unsaturated fatty acids, in the form of methyl esters, has recently been made practical through the use of certain polyesters as partitioning liquids. Preliminary work showed that these polyesters appeared to be selective only toward unsaturated components in mixtures with saturates. It was logical, therefore, to expect that they would perform similarly toward unsaturated alcohols that had been converted to esters.

To prove the feasibility of separating mixtures of unsaturated alcohol acetates on polyester columns quantitatively the authors prepared the individual alcohols in as nearly pure a state as possible. Methyl stearate, methyl oleate, methyl linoleate, and methyl linolenate were quantitatively reduced to the corresponding alcohols by being refluxed with lithium aluminum hydride in ethyl ether. The crude reduction mixtures were chromatographed on 2.5 by 12-centimeter columns of activated alumina to obtain the purified alcohols.

The purified alcohols were converted to the acetate by being refluxed with acetic anhydride.

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ABSTRACTER: Eric J. Gauglitz, Jr.

FISHING WITH TRAPS

ASSAY BY GAS-LIQUID CHROMATOGRAPHY

IDENTIFICATION OF OILS

GAS-LIQUID CHROMATOGRAPHY

4.11

ionizable molecules foreign to the argon carrier gas stream. As argon flows through the chamber during the operation of GLC, radiation from a sealed radioactive source partly ionizes this gas and produces a steady and stable ionization current when a high voltage is applied across the chamber. In addition to the ionized argon molecules, metastable (excited but nonionized) argon atoms are formed whose concentration depends on the strength of the source and on the amount of voltage applied to the chamber. These metastable argon atoms act in a sense as a reservoir of energy and are responsible for the unique sensitivity of this detector. Molecules that enter the chamber and have a lower ionization potential than the excitation potential of argon will, on collision, accept energy from metastable argon atoms to form ion pairs. In this way they produce an increased ionization current that is amplified and recorded. Collisions are relatively very infrequent; therefore less than one part in 10^8 of the applied sample is destroyed during passage through the detector. Fortunately, most volatile organic compounds have ionization potentials below 11.6 electron-volts, the excitation potential of argon, and accordingly they will be detected.

Construction of apparatus.--The main components of the apparatus are as follows: (1) argon, the moving carrier gas; (2) a column that contains the stationary liquid and solid support into which the unknown material is introduced; (3) a heating system to maintain constant temperatures uniformly over both column and detector; (4) a detector to signal and to measure the concentration of components emerging in the effluent gas stream; (5) a high voltage supply to produce a high field strength within the detector cell; and (6) an amplifier-recorder unit to amplify the weak electrical signals of the detector and to record the electrical events on moving graph paper.

Other topics.--Other topics oncluded in this paper are as follows: Assembly of Apparatus, Column Preparation, Preparation of Samples of Fatty Acid Methyl Esters for Chromatography, Sample Loading, Calibration of Instrument, Sensitivity of Instrument, Operation of Instrument, General Maintenance, and Quantitation and Interpretation of Chromatographs.

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Weighed mixtures of these acetates were used for gas-liquid chromatography.

A Beckmann GC-2 was used without modification. The detector was operated at 200 milliamperes, and the column and detector were maintained at 228° C. With the inlet pressure of helium carrier gas at 30 p.s.i.g. and the outlet at atmospheric pressure, the carrier flow-rate through a 9-foot column was 42 milliliters per minute. The sample size was 2 microliters. Peak areas were measured with a compensating planimeter and were defined by drawing tangents to the points of inflection.

A 9-foot column of $\frac{1}{4}$-inch outside diameter stainless steel was packed with 15.1 grams of absorbent, which consisted of 15-percent Resoflex 446 on a support of 60 to 80 mesh Johns-Manville Chromosorb W. Early chromatograms made using Reoplex 400 revealed a tendency of the polyester to "bleed" slowly from the column. Resoflex 446 was found to perform satisfactorily at 230° C. for several weeks of operating time.

Before the alcohol acetates were chromatographed, the behavior of the column was checked by evaluating the separation obtained with known mixtures of the methyl esters of stearic, oleic, linoleic, and linolenic acids. The analyzed area percentages were found to be in good agreement with the actual weight percentages. A known mixture of normal alcohol acetates with chain lengths of 10 through 18 carbon atoms was run to determine optimum operating conditions. No significant difference was found in the actual percentages by weight and the peak area percentages obtained by gas chromatography. Four C_{18} alcohol acetates, which consisted of mixtures of stearyl and oleyl acetates, offered the most difficult problem in separation. Attempts to improve the separation by varying the column temperature were unsuccessful. The high values obtained for the percent of stearyl acetate are as yet unexplained.

Despite these problems, the method is workable and at least as reliable as the ultraviolet spectrophotometric technique. Gas-liquid chromatography was applied to the analysis of alcohol acetates derived from linseed, soybean, and sperm oils. Through the use of the polyester columns, the alcohol acetates have been separated according to chain length and degree of unsaturation.

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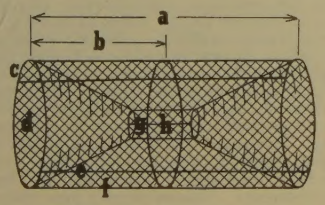
preservatives. Finally, baskets made of wood are mentioned. However, they no longer play a part in fresh water for taking crayfish. As they require too much time, the manufacture of these baskets has become too expensive.



a. length of body
b. distance between rings
c. ring
d. entrance to the throat of the net
e. spreading rod
f. body of the trap
g. exit from the throat
h. trap throat

A type of net used in fresh-water fishing

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Results.--Differential spectra were obtained by using a 10 percent weight-to-volume solution of a Spanish olive oil in the reference beam of the spectrophotometer. Minor deviations, particularly in the neighborhood of 1100 and 1050 cm.$^{-1}$ were encountered with olive oils from different sources. This procedure was used to check 252 samples of olive oil from 12 sources. The deviations from the reference line at 1125 to 1100 cm.$^{-1}$ appear to be attributable to the natural range of concentration of unsaturated fatty acids encountered in olive oil.

Differential spectra of animal fats and oils with olive oil as a reference.--To complete the collection of spectra for identification of fats and oils by differential spectroscopy, the authors obtained the differential spectra of a number of animal fats. These animal fats included marine oils from herring, menhaden, seal, sperm whale, and whale. The authors do not anticipate that animal fats will be used as adulterants for olive oil.

Discussion.--About 10 minutes was required to obtain the differential spectrum of an oil sample, therefore this procedure is one of the fastest techniques available for checking the purity of an oil sample. Most fats and oils can be detected as adulterants in olive oil by this one test if present in amounts of 10 to 20 percent. Considerable effort can be saved by the elimination of the many tests now necessary to check olive oil for each possible adulterant. Because each of the oils tested has a characteristic spectrum, it will be possible to make a rapid identification of many unknown oil samples.

Oils that are similar to each other in character, such as soybean, corn, and cottonseed oils, have very similar differential spectra, if olive oil is used as a reference. However, if one of the other vegetable oils is used for reference, differences between these oils become apparent. Thus, an unknown fat or oil may easily be identified, at least within a group, by differential spectroscopy with olive oil as a reference. More positive identification can then be made by comparing the spectrum of the unknown with the spectrum of one of the other oils in the group.

2.9 A MODIFIED JAFFE TEST FOR DETERMINATION OF PARALYTIC SHELLFISH POISON

McFarran, E. F.; Schantz, E. J.; Campbell, J. E.; and Lewis, K. H. (Milk and Food Research Program, Robert A. Taft Sanitary Engineering Center, Public Health Service, Cincinnati, Ohio)
Journal of the Association of Official Agricultural Chemists 42, 399-404 (May 1959)

A modified Jaffe test has been developed for the determination of paralytic shellfish poison in the eluate from a column of XE-64 ion exchange resin. The modification consists of extracting the unreacted picric acid from the reaction products, after color development at 38° C. for 20 minutes, with a mixture of 25 percent pyridine in ethyl acetate. This procedure makes possible the measurement of the density of the colors developed at their wavelengths of maximum absorption, namely, at 375 mμ for the interfering material and at 490 mμ for shellfish poison. By constructing standard curves for purified shellfish poison and for the interfering material, isolated from nontoxic clams, from data obtained by measuring the absorbence of the colors at these two wavelengths, an equation has been derived for calculating the amount of poison present in column eluates containing variable amounts of interfering material.

This modified Jaffe test has been applied successfully to the quantitative determination of the poison in several species of clams and mussels, but has not proved satisfactory for analysis of the poison content of Pacific oysters, presumably because of the amount of interfering material present.

Precision of the chemical assay has been increased by using this modified Jaffe test and, as indicated by recovery studies, is about ±31.9 mmg. per 100 grams of shellfish. If several 4 ml. aliquots of the same eluate are analyzed, the precision can be improved considerably. Because of the effect of salt on the bioassay at lower levels of toxicity, and the multiplication of the error inherent in the bioassay by the dilution involved in testing shellfish of higher toxicity, the chemical assay is

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Authors' summary

4.62 BASIC SUBSTANCES AS SYNERGISTS FOR FAT ANTIOXIDANTS

Olcott, H. S. and Kuta, E. J. (University of California, Berkeley)
Nature 183, 1812 (June 27, 1959)

Introduction.--In this study, the authors demonstrated that many oil-soluble basic substances may act as synergists. Octadecylamine (ODA), a primary amine; proline, a secondary amine; and triiso-octylamine (TOA), a tertiary amine, provided unexpectedly good protection against oxidation in oils containing added 6-ethoxy-2, 2, 4-trimethyl-1, 2-dihydroquinoline (EMQ). In the absence of EMQ, these amines at similar levels conferred only slight protection or no protection as is shown in table 1 (see over).

Basic additive.--The effects of the various basic additives differed with the antioxidant used. For example, they behaved (1) as synergists toward 2-tertiarybutyl-4-methoxyphenol (BHA), (2) without effect toward 2,6-ditertiarybutyl-4-methoxyphenol (BHT), and (3) as antagonists toward BHT. In addition, they were more effective with γ-tocopherol than with α-tocopherol; consequently, they were useful for evaluating the antioxidant effectiveness of the various tocopherols.

Substrate effect.--Substrates also affected the respective activities of the amines. In samples of highly purified trilinolein, ODA acted as an antagonist toward α-tocopherol and as a synergist toward γ-tocopherol, whereas, in menhaden oil, ODA was synergistic toward both tocopherols. The addition of 0.0, 0.025, and 0.05 percent of proline to refined olive oil provided induction periods of 4, 12, and 23 days, respectively, at 60° C.

Synergistic effect.--If the basic groups that are a part of the phospholipids and a part of some of the amino acids are modified (1) by chelation with heavy metals, (2) by changes that affect the solubility of the parent compound, and (3) by other changes, the synergistic effect of these compounds becomes mediated toward phenolic-type antioxidants.

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ABSTRACTER: Martin Heerdt

4.29 n-DECA-2, 4-DIENAL, ITS ORIGIN FROM LINOLEATE AND FLAVOR SIGNIFICANCE IN FATS

Patton, Stuart; Barnes, Isabel J.; and Evans, Laura E.
Journal of the American Oil Chemists' Society 36, 280-283 (July 1959)

Decadienal has been shown to be "fantastically" potent as a flavor compound. Its flavor-threshold value in water was determined to be 0.5 parts per billion. By experimentation, it is shown that the formation of decadienal through the action of moisture and heat seems predictable from any fat that contains linoleate.

Distillates from cottonseed oil, soybean oil, beef tallow, and lard were evaluated. These fats were in good condition and considered to be representative of the materials processed by industry. The samples were steam-deodorized in amounts of 3 liters each at a temperature of 225° C. and a pressure of 1 millimeter of mercury for 3 to 5 hours, using conventional laboratory deodorizing equipment. The thawed distillates from the four fats had very pronounced odors reminiscent of fat that had been used many times for frying.

2, 4-Dinitrophenylhydrazones of carbonyl compounds in the distillates were prepared. Hexane solutions derived from distillates of the four fats were employed as the source of samples for column and paper chromatographic separation of the dinitrophenyl (DNP) hydrazones. Celite was used as the support, nitromethane as the immobile phase, and n-hexane as the moving phase in column separation. Paper chromatography was used to follow the separation of hydrazone bands on the column and to aid in identification. Although there was evidence of numerous hydrazones, one red derivative from all four fats predominated in intensity.

Approximately one-half of each of the original hexane solutions of the mixed hydrazones was

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ABSTRACTER: Edward H. Gruger, Jr.

4.92 NUTRITIONAL PHYSIOLOGY OF THE RUMEN: A NEW APPROACH TO RUMEN NUTRITION

Shaw, J. C. (Chief, Animal Production Branch, Food and Agriculture Organization (FAO) of the United Nations, Rome, Italy)
Feedstuffs 31, 18-23 (September 12, 1959)

Fish oils and rumen volatile fatty acids.--For over 30 years nutritionists have known that cod-liver oil and other fish oils depress the fat content of milk, but the cause has remained unknown. The most commonly accepted theory has been that the long-chain unsaturated fatty acids exert a poisoning effect on certain enzyme systems of the udder.

Good correlations were noted earlier in this study (1) between the ratio of rumen acetate (positive correlation) to propionate (negative correlation) and (2) in the effect of this ratio on the fat content of milk. Therefore, the author suspected that cod-liver oil exerts its milk-fat depressing effect by altering the relative production of acetate and propionate in the rumen. Some selected data from a study of the effect of cod-liver oil and certain unsaturated fatty acids on milk fat production and rumen fluid composition are shown in the table (see over).

Discussion.--A remarkable change was effected in the proportions of rumen acetate and propionate by the feeding of cod-liver oil and some unsaturated fatty acids. Maximum effect was produced by feeding highly unsaturated linoleic acid. The author concludes that this is the long sought answer to the effect of cod-liver oil on the fat content of milk. The findings provide rather dramatic support for the concept that the fat content of milk is controlled primarily by the proportions in which the volatile fatty acids are produced within the rumen.

Conclusions.--The author believes that this discovery is important because it

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ABSTRACTER: Martin Heerdt

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separated, and the eluted bands corresponding to the red hydrazone from each fat were combined and evaporated to dryness. Ultraviolet absorption measurements and paper chromatographic analysis, when evaluated in the light of previous knowledge, suggested that the red hydrazones from the fats were identical and probably hydrazones of n-deca-2,4-dienal. Melting-point comparisons with an authentic sample of DNP hydrazone of decadienal substantiated the identity of the red hydrazones from the four fats.

Taken from the authors' summary: n-Deca-2,4-dienal also was demonstrated as a principle carbonyl component in the heat decomposition of methyl linoleate in the presence of moisture. n-Hept-2-enal and C_{10} and C_9 2-enals also were detected in the latter system. Flavor and odor qualities of the dienal perhaps are described best by the term "deep-fried."

The compound's significance in fried and baked foods and its performance in the Kreis and 2-thiobarbituric acid tests for fat oxidation are discussed.

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more accurate than the bioassay when applied to the analysis of the poison content of clams and mussels.

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provides a new concept for the control of rumen microbial metabolism. Therefore, he postulates that the efficiency of growth and fattening can be increased by feeding nontoxic compounds, which will decrease the proportion of acetate and increase the proportion of propionate in the rumen. The replacement of fish and fish liver oils in the diet with nontoxic compounds probably will improve protein digestion.

The effect of diets containing cod-liver oil and of those containing long-chain unsaturated fatty acids on the fat content of the milk and on the volatile fatty acids in the rumen fluid of the cow.

Cow no.	Additive [1/] of cow	to diet	Time after feeding additive	Milk fat	Volatile fatty acids in rumen fluid	Relative amounts of certain rumen acids			
						Acetic	Propionic	Butyric	Valeric
			Hr.	%	Mg./100 ml.	. . . Molar percent			
1	cod liver oil		0	2.9	636	71.1	14.1	12.5	3.2
			63	2.4	788	56.1	28.2	9.1	6.6
2	oleic acid		0	5.0	448	67.4	15.4	11.8	5.3
			63	4.5	870	61.4	21.5	14.3	2.7
3	linoleic acid		0	4.0	584	78.9	9.9	7.7	3.4
			63	2.6	762	52.2	29.9	14.0	3.8

[1/] At the ratio of 300 milliliters per day.

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Table 1.--Effect of mixtures of antioxidants with basic synergists on menhaden oil and trilinolein

Antioxidant	Basic additive	Induction periods - Days (50° C.)	
		Menhaden oil	Trilinolein
EMQ	None	3	31
EMQ	ODA	28	56
EMQ	Proline	87	61
EMQ	TOA	104	41
EMQ	Phospholipid	33	--
BHA	None	2	12
BHA	TOA	11	15
BHT	None	4	19
BHT	TOA	2	12
α-tocopherol	None	2	10
α-tocopherol	ODA	3	6
α-tocopherol	Proline	3	18
α-tocopherol	TOA	17	7
γ-tocopherol	None	3	13
γ-tocopherol	ODA	9	31
γ-tocopherol	Proline	25	--
γ-tocopherol	TOA	36	36
None	None	1	1
None	ODA	1	1
None	Proline	1	1
None	TOA	1	1

3.12 THE USE OF AUREOMYCIN FOR FISH PRESERVATION UNDER SOUTH AFRICAN CONDITIONS

Georgala, D. L. (Fishing Industry Research Institute, University of Cape Town, Rondebosch, C. P.)
Fishing Industry Research Institute, Progress Report No. 38, 5 pp. (February 1959) (South Africa)

Aims of the investigations.--The investigations were planned to determine: (a) by microbiological assay, the actual concentration of aureomycin in crushed ice made from blocks containing a theoretical 5 p.p.m. of the antibiotic; (b) by bacteriological and organoleptic examination, whether hake stored in such ice from the time of catching remained fresh and edible for a longer period than similar fish in ordinary ice; (c) whether the same effect could be obtained by applying the aureomycin ice to the fish after they had spent some days in ordinary ice; (d) whether storage of hake in aureomycin ice, or dipping in aureomycin solutions, extended their storage life when they were subsequently exposed at temperatures above 32° F.; (e) whether the incorporation of aureomycin in brine and dye solutions extended the storage life of smoked hake fillets normally treated with such solutions; and (f) what amounts of aureomycin were absorbed into the tissues of fish treated with aureomycin by various methods.

Conclusions.-- The presence of 2 to 5 p.p.m. aureomycin in crushed ice resulted in a marked extension in the storage life of iced hake, provided the aureomycin ice was applied shortly after catching. The maintenance of the "fresh-looking" appearance of the fish, together with the delay in the development of off-odors, would extend the time available for the trawler's voyage and for the railage and distribution of the fish.

The penetration of aureomycin into the tissues of fish treated with the antibiotic was very limited, and was confined mainly to the skin, where heat destruction of the antiobitic would be fastest. Aureomycin could not be detected in several of the flesh samples from hake that had been stored in aureomycin ice.

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6.190 ENERGY EVALUATION OF FEEDSTUFFS

Wood, J. A. (University of British Columbia)
Feedstuffs 31, 26-29 (July 18, 1959)

Rate of basal metabolism.--A pig or steer with an empty digestive tract, if placed in a thermally comfortable environment and persuaded to remain quiescent, will give off an amount of heat that bears a fairly definite relationship to its body weight. This amount of heat energy is referred to as its rate of basal metabolism, which is the minimal amount of energy that is compatible with its existence as a warm-blooded animal. The fuel used to provide this energy is provided by its own tissues. If it is to remain a living entity for any length of time, an alternative source of fuel must be supplied from external sources such as feed.

If an amount of digestible-feed energy is provided that is exactly equivalent to this basal-metabolism rate, the animal's total heat production will increase, owing to a heat increment associated with the consumption of this feed. This heat increment is called the specific dynamic effect of the feed. To make up the difference between the digestible-energy intake and the now elevated heat production, the animal will burn an additional portion of its own body tissues.

If additional increments of feed energy are provided, the animal eventually will reach a point of positive energy balance. When the digestible-energy intake exceeds the heat production, the animal will have chemical energy available for carrying out useful agricultural functions. These include gaining weight, producing milk, laying eggs, growing wool, or pulling a load, depending upon the nature of the animal. If the feed intake provides the precise amount of digestible energy required to cover the basal-metabolism rate plus the specific dynamic effect, the animal will be at its maintenance level.

Feed-energy categories.--The work of the nutritionist is to determine the precise amount of

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 ABSTRACTER: Martin Heerdt

6.190 REVIEW OF POULTRY SCIENCE PAPERS PRESENTED ON NUTRITION, RELATED SUBJECTS. THE NUTRITIVE VALUE OF DEFATTED STARFISH MEAL

Couch, J. R. (Texas A & M College, College Station)
Feedstuffs 31, 6, 81-82 (August 22, 1959)

Introduction.--Among a number of papers presented at the Poultry Science Association meeting at Ames, Iowa, on August 4 to 7, 1959, was one entitled "The Nutritive Value of Defatted Starfish Meal," by N. T. Rand of the VioBin Corporation. According to the author, starfish that have been processed into meal offer an additional protein supplement for use in poultry feeds.

Analysis.--Analysis shows that whole starfish meal contains 3 to 7 percent moisture, 30 to 61 percent ash, 27 to 36 percent protein, 4 to 8 percent fat, and 8 to 28 percent carbohydrate or nitrogen-free extract material. Defatted starfish meal contains 4 percent moisture, 47 percent ash, 30 percent protein, 0.3 percent fat, and 19 percent nitrogen-free extract. The ash contains considerable calcium carbonate.

Nutritive value.--In a Drackett protein-type synthetic diet, the addition of 2 percent of defatted starfish meal to the diet produced a significant increase in growth. This growth effect shows that the product contains unidentified growth factor activity. The addition of 3 percent of defatted starfish meal to a practical diet based on corn-soybean-oil meal also produced an increase in growth.

Conclusions.--Defatted starfish meal could be used as a source of protein, calcium, and unidentified growth factors in the formulation of practical poultry feeds. This product could enter the feed-ingredient field in an area where the industry is deficient in unidentified growth factor supplements.

 ABSTRACTER: Martin Heerdt

6.32 ALGAE AS A SOURCE OF HUMAN FOOD

Anonymous
Nutrition Reviews 17, 238-240 (August 1959)

Introduction.--Studies conducted on algae since 1949 have disclosed that cultures of Chlorella could produce food at a rapid rate when given optimal conditions of cluture medium, carbon dioxide, and sunlight. The efficiency of this tiny algal plant is indicated by a measure of food production called the degree of reduction. This is based upon the photosynthesis ability of the plant (1) to endothermically reduce CO_2 and H_2O and (2) to liberate O_2 and store energy. In this ability, Chlorella rates higher than do corn leaves, sunflower, or sugar maple wood. By analysis, Chlorella contains admirable quantities of protein (up to 58 percent) as well as carbohydrates and fat. Chlorella also has the ability to undergo constant mutation in response to environmental manipulations. This has permitted the development of strains capable of producing large quantities of protein. Mathematical extrapolation from laboratory yields indicates that 1 acre of Chlorella culture medium could produce about 40 tons of dried high-protein food per year. However, the problems of sterility, quality control, and processing would be costly and difficult.

Since 1954, a group of Japanese scientists has been conducting extensive studies on Chlorella as a source of food, Nutrition Reviews 13, 13 (1955). This group demonstrated that the addition of dried Chlorella powders to bread, ice cream, noodles, and similar staples increased their content of protein, vitamin A, and ascorbic acid and yielded foods that had an agreeable taste and a greenish color that was not unpleasant.

In the Annual Report of the National Institute of Nutrition, Toyamacho, Tokyo, Japan (1958), two groups of scientists published reports on studies of algae. The first group, E. Tamura et al., found

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that Chlorella and Scenedesmus were rich in protein, contained adequate amounts of the essential amino acids except methionine, and provided an abundance of vitamin A. These workers also found that the dried powder was digested incompletely and accepted poorly, owing to its odor, flavor, and color. Decolorizing the dried algae with methyl alcohol not only reduced the odor and color but also improved its digestibility. Weanling rats fed dried Chlorella or Scenedesmus grew poorly as compared with similar rats fed casein. Decolorization of the algae improved the growth of the rats, but the product continued to be inferior to casein. The addition of methionine improved the nutritional value of the dried Chlorella enough to support optimal growth.

The second group, H. Hayami and K. Shino, reporting in the same publication, described the effects of feeding a diet containing 19 percent decolorized Chlorella to young white rats. Growth responses were: casein 95.5 g., decolorized Chlorella 84.8 g., and dried Chlorella 66.6 g. These same workers also investigated the rate of absorption of decolorized Chlorella in five men. They found that much of the objectionable taste and odor of Chlorella was removed by decolorization but that the remaining smell and taste of the decolorized Chlorella were intolerable. The five men were given a basal diet containing 2300 calories and 60 g. of protein per day. Three days later, in addition to their basal diet, they were given 30 g. of decolorized Chlorella (21 grams of protein). In the final 3-day period, they were given the basal diet and 100 g. of beef. The true digestibility of the three dietary regimes was calculated to be: basal diet 82.9 percent, decolorized Chlorella 83.0 percent, and beef 87.7 percent.

From these and previous studies, the reviewers concluded that algae do have nutritive value that can be applied to human nutrition. The obvious objections to such an application include cost of production, cost of processing, a relative deficiency in certain vital nutrients such as methionine, incomplete digestibility, and poor acceptability due to odor, flavor, and color.

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Table 2.--Average raw odor values, skin bacterial counts, and external appearances of hake stored in ordinary and aureomycin ices, in tests 2a and b.

Test no.	Period of storage in ice	Type of ice	Average odors value	External appearances	Average viable bacterial count per cm.^{2}
2a	5 days	Ordinary	8.1	Bright and "fresh-looking"	--
		Aureomycin	8.2	Bright and "fresh-looking"	36.
2b	5 days	Ordinary	8.0	Bright and "fresh-looking"	36,950
		Aureomycin	8.1	Bright and "fresh-looking"	16,150
2a	8 days	Ordinary	7.8	Bright and "fresh-looking"	851,000
		Aureomycin	7.8	Bright and "fresh-looking"	86,200
2b	8 days	Ordinary	7.8	Flesh surfaces becoming discolored	769,500
		Aureomycin	7.9	Bright and "fresh-looking"	13,950
2b	12 days	Ordinary	5.3	Flesh surfaces discolored	5,680,000
		Aureomycin	7.9	Bright and "fresh-looking"	250,500
2a	13 days	Ordinary	4.7	Flesh surfaces discolored, slime on skin	17,775,000
		Aureomycin	6.8	Bright and "fresh-looking"	72,750
2b	15 days	Ordinary	4.8	Discolored, slime on skin and flesh	6,685,000
		Aureomycin	7.5	No discoloration, no slime present	68,600
2b	19 days	Ordinary	2.5	Much yellow slime on skin and flesh	48,750,000
		Aureomycin	5.1	Slightly discolored, no slime on skin, little on flesh	1,123,500
2b	22 days	Ordinary	0.4	Very much yellow slime on skin and flesh	64,450,000
		Aureomycin	5.3	No slime on skin, some on flesh	942,500

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energy needed for each body function and to translate these energy requirements into feed terms. The author has defined five feed-energy categories to facilitate this translation: (1) Gross feed energy is the total yield of heat energy obtainable from a feedstuff when it is oxidized to carbon dioxide and water in the bomb calorimeter. This category has limited nutritional significance. (2) Digestible feed energy is the gross energy of the feed less the gross energy of the feces that arise from it, or the portion of the gross energy that crosses the intestinal or rumen walls and passes into the animal's metabolic pool. (3) Metabolizable energy is the digestible energy of the feed less the urinary energy that arises from it. (4) Net energy is the metabolizable energy of the feed less the specific dynamic effect arising from its utilization. (5) Specific dynamic effect is the fraction of the metabolizable energy that arises as heat in the course of all the metabolic processes associated with the rearrangement and ultimate use of the digestible energy. This fraction serves only to warm the animal; it is not converted into usable animal products.

These definitions indicate that the net energy is of most importance to the animal. From this net-energy fraction, the animal obtains the heat necessary (1) to cover the cost of its continuous heat production and (2) to provide the chemical energy that is reformulated in the course of metabolism to make new muscle itssue, to lay down body fat, to produce milk, or to carry out other valuable functions. The precise net energy yield obtainable from any particular feedstuff is a function of (1) the chemical nature of the feedstuff, (2) the nature of the other nutrients fed with that feedstuff, (3) the intake level at which the feed is provided, (4) the anatomical and metabolic features of the animal consuming the feed, and (5) the nature of the productive function the animal is attempting to perform.

3.338 WHAT IS OUTLOOK FOR ALUMINUM CANS?

Gotsch, L. P.; Brighton, K. W.; and Eike, E. F. (National Canners Association, Chicago, Illinois)
Western Canner and Packer 128, 54 (June 1959)

Can companies and the canning industry are interested in aluminum as a possible second metal for metal containers for security reasons, and because aluminum production is growing and there is the potential of lower prices.

Currently, products packed in aluminum cans include sardines, beer, oil and cheese. Experience with these, plus laboratory work, indicates that such cans are of adequate strength when the gauge is 35 to 40 percent above tinplate. The cost of such cans is equal to those made from tinplate when the gauge is identical. They can be handled in canning plants by methods similar to those used for tinplate cans, but some machines will have to be modified to avoid excessive denting and to keep the containers on the track in can runs. Also, special unscramblers for top or bottom orienting, and perhaps new runways to avoid jamming, may be required.

European experience seems to indicate that practically all food cans would have to be enameled, and that even with enamels shelf-life may be shorter when pH is below 5. Also, some colored products experience color bleaching, and some meat items are subject to sulfur-staining. Aluminum alloys vary in their corrosion-resistance, and those which offer the best food protection are usually the softest and most subject to denting and jamming.

Four types of can manufacture offer possibilities: (1) drawing, generally for short cans; (2) reverse extrusion, which has the penalty of a heavy bottom; (3) forward extrusion, which produces a cylinder without top or bottom; (4) drawing and ironing, which makes a thick can first and then "irons" it thin.

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6.193 SOURCES OF UNIDENTIFIED FACTORS FOR PRACTICAL POULTRY DIETS 1. THE VALUE OF FISH MEALS, MEAT MEALS AND FISH SOLUBLES FOR CHICKS AND BROILERS

Summers, J. D.; Pepper, W. F.; and Slinger, S. J. (Ontario Agricultural College, Guelph, Ontario, Canada)
Poultry Science 38, 816-825 (July 1959)

Introduction.--Considerable evidence has accumulated in the literature to indicate the presence of unidentified chick growth factors in certain natural feeds, including fish meals, meat meals, and condensed fish solubles.

March and Biely (1948) and March et el. (1949) showed that the nutritional value of various market samples of fish meals and meat meals as protein supplements varies greatly according to the protein quality index of Almquist et al. (1935). March et al. (1949) also reported that the relative feeding value of the different fish meals and meat meals as protein supplements was much the same irrespective of whether corn or wheat was fed as the principal cereal grain in the basal diet.

Purpose.--The present experiments were designed to determine the unidentified growth-factor activity of three market samples of fish meal, three market samples of meat meal, and one sample of condensed fish solubles. Since corn and wheat are used more or less interchangeably in chick and broiler rations in Ontario, the authors also investigated (1) the influence of these cereals on the fish growth-factor response and (2) the relative feeding value of corn and wheat.

Experimental procedure.--The basal diets used in all experiments contained 2.5 percent of dried whey or dried buttermilk as a source of whey growth-factor activity. When supplements of fish meal,

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6.193 SOURCES OF UNIDENTIFIED FACTORS FOR PRACTICAL POULTRY DIETS 2. THE VALUE OF FISH SOLUBLES, DRIED WHEY, DRIED DISTILLERS' SOLUBLES, AND CERTAIN FERMENTATION PRODUCTS FOR CHICK AND BROILER DIETS

Summers, J. D.; Pepper, W. F.; and Slinger, S. J. (Ontario Agricultural College, Guelph, Ontario, Canada)
Poultry Science 38, 846-854 (July 1959)

Introduction.--In previous studies conducted in their laboratories (Summers et al. 1959), the authors found that with diets containing either 2.5 percent of dried whey or 2.5 percent of dried buttermilk, no unidentified-factor response could be demonstrated with three market samples of fish meal or three market samples of meat meal. Fish solubles, on the other hand, consistently improved growth under similar conditions. The unidentified-factor response from fish solubles was not influenced by the levels of corn and wheat present in the diets.

Purpose.--The present studies were designed to determine the relative values of fish solubles, dried whey, Vigofac, Neovite, Solulac, Stimuflav, and Mazoferm. Vigofac is a fermentation product obtained from Pfizer Canada, Ltd. Neovite is a fermentation product obtained from Dawe's Laboratories. Solulac is a product containing 70 percent corn distillers' solubles and 30 percent corn distillers' grains produced by the Grain Processing Corporation, Muscatine, Iowa. Stimuflav is corn distillers' dried solubles manufactured by Hiram Walker and Sons, Ltd., whereas Mazoferm is a brand of corn fermentation solubles produced by Corn Products Refining Company. All of these products are being offered to the feed trade as sources of unidentified growth factors.

Procedure.--Commercially hatched chicks were obtained from hens kept on litter and fed practical diets. The practical diets used in all experiments were offered to the birds ad libitum. Sexed

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6.193 SOURCES OF UNIDENTIFIED FACTORS FOR PRACTICAL POULTRY DIETS 3. THE VALUE OF FISH SOLUBLES, DRIED WHEY AND CERTAIN FERMENTATION PRODUCTS FOR TURKEYS

Summers, J. D.; Pepper, W. F.; and Slinger, S. J. (Ontario Agricultural College, Guelph, Ontario, Canada)
Poultry Science 38, 922-928 (July 1959)

Introduction.--Several ingredients have been reported to contain unidentified factors required for growth by the poult. Branion and Hill (1953) have reviewed much of the literature on this subject. Positive responses to ingredients generally considered to be sources of unidentified growth factors have not always been obtained.

Purpose.--The present three experiments were made to investigate the value for turkeys of dried whey, condensed fish solubles, the commercial fermentation products Vigofac and Neovite, and streptomycin mycelial meal. Since corn and wheat are used more or less interchangeably in turkey diets in Ontario, the authors also desired to determine the influence of these cereals on the response to certain unidentified-factor sources.

Experimental procedure.--When supplements of condensed fish solubles or dried whey were included in the various basal diets, the levels of protein, productive energy, calcium, phosphorus, vitamin B_{12}, and methionine were kept constant by making adjustments in the amounts of corn, soybean-oil meal, limestone, dicalcium phosphate, tallow, vitamin B_{12}, and methionine in the experimental diets. When wheat was used to replace corn, the above nutrients as well as manganese, pantothenic acid, niacin, and leucine were maintained from diet to diet at about constant levels. To maintain a constant level of leucine in this experiment, the authors included a small amount of corn

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meat meal, or fish solubles were included in the various basal diets, the levels of protein, productive energy, calcium, phosphorus, vitamin B_{12}, and methionine were kept constant by adjusting the amounts of corn, soybean-oil meal, limestone, bone meal, tallow, vitamin B_{12}, and methionine in the experimental diets. The energy values used were the productive energy values of Titus (1955), whereas the values used for most other nutrients were the average analyses values of the National Research Council (1954). The diets and water were offered ad libitum in all experiments.

Results.--No unidentified growth-factor response could be demonstrated with any of the samples of fish meal or meat meal included in the diets, whereas the fish solubles gave a fairly consistent growth response. These results indicate that fish meals and meat meals are not reliable sources of unidentified growth-factor activity. The unidentified growth-factor response from fish solubles was not influenced by the levels of corn and wheat in the diet.

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gluten meal in the high-wheat diets. The energy values used were the productive energy values of Titus (1955), whereas the values for most other nutrients were the average analyses values of the National Research Council (1954). Vigofac, Neovite, and streptomycin mycelial meal were included in the diets in relatively small amounts, and the complete analyses of these products were unknown. The diets and water were offered ad libitum in all experiments.

Sexed, Broad Breasted Bronze poults hatched from the college flock were used in all experiments. The breeders were fed a practical ration containing fish meal, dried whey, and dehydrated alfalfa meal and were maintained on deep litter. Experiments 1 and 2 were of 4 weeks' duration. Experiment 3 was of 24 weeks' duration.

Results.--The use of 2.5 percent of dried whey or 2.5 percent of fish solubles alone in the diets permitted no significant weight or feed efficiency response. In two of the three experiments, the combination of 2.5 percent of dried whey and 2.5 percent of fish solubles gave small but statistically significant weight increases. In the experiment in which poults were carried to 24 weeks of age, no response was obtained with this combination at 4, 8, or 24 weeks of age. Where a response was obtained with poults at 4 weeks of age, the magnitude of the response was such as to make questionable the economy of the use of these unidentified-factor supplements in practical diets.

Diets containing wheat gave superior weight and feed efficiency as compared with diets containing all corn. Also, dried whey and fish solubles gave a somewhat greater response with diets containing corn than they did with diets containing all wheat. The evidence suggests that wheat may contain unidentified-factor activity similar to that present in the other supplements. The wheat response possibly may be explained in part by the fact that the wheat diets were somewhat higher in fat content than the corn diets. Vigofac, Neovite, and streptomycin mycelial meal gave no weight or feed efficiency responses under the conditions of these experiments.

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Vantress X Pilch Rock Chicks were used in this study, and three replicates of 10 males and 10 females were used for each treatment. These chicks were housed in battery brooders with raised wire floors and were weighed at 4 weeks of age. Weight and feed consumption were recorded.

Results.--Supplementation of practical diets with 2.5 percent of condensed fish solubles produced a greater unidentified-factor response than did supplementation with 2.5 percent of dried whey. The combination of 2.5 percent of dried whey and 2.5 percent of fish solubles permitted results that were essentially the same as those obtained with 2.5 percent of fish solubles alone. Dried whey appears to supply unidentified-factor activity already present in fish solubles.

Vigofac, a condensed fermentation product used at 0.5-percent level in the feed, resulted in just as good weight and feed efficiency as did a combination of 2.5 percent of condensed fish solubles and 2.5 percent of dried whey. Levels of 0.15 and 0.3 percent of Vigofac were too low to completely replace the unidentified-factor activity of a combination of 2.5 percent of fish solubles and 2.5 percent of dried whey. Solulac at the 2.5-percent level and Neovite at the 1.0-percent level in the feed proved somewhat less effective in promoting growth than did 2.5 percent of fish solubles, 2.5 percent of dried whey, or 0.15 percent of Vigofac.

Mazoferm, a corn fermentation condensed solubles used at a level of 3 percent in the all-vegetable protein diets, gave a growth response in the absence of penicillin or zinc bacitracin, but not in the presence of these antibiotics. A sparing type of relationship appears to exist, therefore, between Mazoferm and these antibiotics. Broiler diets containing low levels of fish meal, meat meal, and dried buttermilk were not improved by supplementation with 2.5 percent of Stimuflav, a brand of corn distillers' dried solubles. The results suggest that the over-supplementation of certain practical diets with sources of unidentified factors may cause a reduction in the weight of broilers.

Although statistically significant weight responses may be obtained with several sources of unidentified factors, the most economical gains appear to be produced without supplementary sources of these factors. Before sources of unidentified factors are included in practical diets, consideration should be given to the economic as well as the nutritional aspects.

7.80 SOME OBSERVATIONS CONCERNING EXPERIMENTAL APPLICATION OF OBJECTIVE QUALITY TESTS TO WEST COAST FISH

Tarr, H. L. A. (Fisheries Research Board of Canada, Technological Station, Vancouver, B. C.)
A paper prepared for the Canadian Fish Inspectors' Annual Meeting in Ottawa, November 1958, 9 pp.

Fish spoilage falls into two important categories: (1) bacterial and enzymic spoilage of fresh fish and (2) spoilage of frozen fish. The purpose of this paper is to discuss briefly past research that could have a bearing on current fishery-inspection problems on the Pacific Coast of North America.

The 1937 Annual Report of the Pacific Fisheries Experimental Station contained summaries regarding bacteriological, chemical, and biochemical studies carried out in an attempt to discover good objective tests for halibut quality. A number of different methods were studied, with rather inconclusive results. It was found that the viable bacterial population of the poke muscle of halibut increased much more rapidly than did that of the muscle near the anal region during storage in ice, and there was poor agreement between trimethylamine tests and viable bacterial counts. There was indication that a test for hydrogen sulfide would be worthless, since there was no tendency for an increase due to storage, the values being scattered throughout. No correlation between the acid-soluble inorganic phosphorus of the muscle and storage time was found. Among other tests were studies with a textometer as indication of firmness of the flesh, determinations of total volatile nitrogen, and studies of Stansby's A and B values. These tests, in general, did not indicate good correlations with storage time of halibut in ice, or else insufficient tests were conducted to establish definite correlations.

Following this series of experiments, objective tests for quality have been conducted from time to time at the same station, usually such tests being used as criteria of quality in experimental work dealing with preservation of different species of fish.

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 ABSTRACTER: June H. Olden

8.59 ABNORMALLY COLOURED GROUNDFISH FILLETS

Hennessey, J. P. (Fish Inspection Laboratory, St. John's, Newfoundland)
A paper prepared for the Canadian Fish Inspectors' Annual Meeting in Ottawa, November 1958, 4 pp.

Groundfish fillets with coloring considered abnormal to the species have been noticed in fish-filleting plants in Great Britain and Newfoundland. Pink-fleshed cod fillets were observed on fish caught in the North Sea, and similarly colored rosefish fillets were noticed on fish caught in the Isle aux Morts area of Newfoundland.

The cod fillets were pink throughout the entire muscle. The muscle was extracted with acetone, and readings for optical density were made at various wavelengths with a spectrophotometer. The resulting curve showed a peak in the vicinity of 475mμ, which coincided with that known to be the point of maximum optical density for astaxanthin, a pigment occurring naturally in the chromatophores of the skin of such fish as rosefish and cod. An analysis of the cod fillets showed solids, crude protein, and fat to be present in normal amounts. The abnormal rosefish fillets were similarly analyzed, and the Fishereis Research Board of Canada published a paper on this occurrence.

At the request of the Biological Station in St. John's, Newfoundland, 17 pink- or salmon-colored groundfish fillets--12 rosefish and 5 cod--were forwarded for examination and analysis from plants in Burgeo, Isle aux Morts, Gaultois, and Bonavista. Acetone extracts were made, and the maximum for the deeply pigmented fillets occurred in the vicinity of 475 mμ, the same as that for the cod fillets in Great Britain.

The fillets from the plant at Bonavista, located on the northeast coast, did not indicate the presence of astaxanthin and were not completely colored throughout. In fact, the Biological Station con-

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 ABSTRACTER: June H. Olden

9.16 FISH FARMING BECOMING IMPORTANT ENTERPRISE ON ARKANSAS FARMS

Anonymous
Feedstuffs 31, 78 (August 15, 1959)

Fish farming is becoming an important enterprise on several Arkansas farms, according to B. L. Green and Dr. Troy Mullins in a report issued by the Arkansas Agricultural Experiment Station.

The researchers said more than 25,000 acres of water were utilized in 1958 for producing food fish in rotation with rice. An additional 50,000 acres of reservoirs will be used for this purpose by 1960, they estimate.

Mr. Green is research assistant with the university's experiment station and cooperator with the U. S. Department of Agriculture. Dr. Mullins is agricultural economist with the USDA, stationed with the Arkansas station. They interviewed 35 farmers in eastern Arkansas to find out about production practices in growing fish for food and the problems encountered.

On a 12-month basis, fish production averaged 106 lb. an acre for 22 reservoirs harvested. Returns above stocking rate averaged about $16 an acre for a 12-month period. Income figures do not include receipts from sale of fingerlings, which in a few instances represented appreciable sums, Mr. Green and Dr. Mullins asserted. They added that income varied widely between farms. Income is influenced by species combination and stocking rate of fish.

In general, farmers anticipated average rice yields of 105 bu. an acre without fertilizer on fields following a crop of fish. Thirty farmers estimated that rice yielded only 75 bu. an acre when

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9.3 THE DANISH FISH INSPECTION SERVICE

Jensen, Poul Fr. (Director, Inspection Service for Fish Products, Danish Ministry of Fisheries)
A paper prepared for the Canadian Fish Inspectors' Annual Meeting in Ottawa, November 1958, 12 pp.

In 1957, Danish fisheries yielded 526 million kilograms (kg.) of fish valued at 290 million Danish crowns. Total exports of fish and fish products amounted to 162 million kg., and imports were 51 million kg.

The Danish law on quality control provides that the purchase and sale of; the storing, freezing, preserving, and other processing or handling of; as well as the transport of fish and fish products in bad condition is forbidden. The law covers fish for export, fish for domestic consumption, and imported fish. It does not cover fish and fish products not intended for human consumption.

Administration of quality control is exercised by a combined system of centralized and decentralized control. The decentralized-control body is the Fisheries Inspection Service. All control concerning the quality and handling of fresh fish is carried out by the Fisheries Inspection Service. In addition, these inspectors must inspect the fish-processing plants. They control the sanitation, the quality of the raw materials, the production in general, the quality of the products, and the labeling or marking of the products. Inspection of the fish-processing plants, however, is supervised by the Inspection Service for Fish Products, which is the centralized-control body.

The Quality Law contains provisions that clean and sanitary conditions shall be maintained wherever fish and fish products are stored or handled; that the fish shall not be exposed to conditions that can cause deterioration of quality; and that all vessels, premises, equipment, and so forth used in

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 ABSTRACTER: June H. Olden

OBJECTIVE QUALITY TESTS

PIGMENTED GROUNDFISH FILLETS

FISH FARMING IN ARKANSAS

DANISH FISH-INSPECTION SERVICE

8.59

considered their coloring to be due more to abnormal blood conditions in old fish than to pigmentation. Since all other fillets were from plants on the western part of the south coast of the island and were from fish caught in the waters off the south coast, the Fisheries Research Board is now investigating whether such colored fillets are common to fish caught in these waters.

Results of chemical analyses of some of the colored fillets and of normal fillets are shown below.

Table 2.--Analyses of colored and normal fillets*

	Rosefish		Cod	
	Colored	Normal	Colored	Normal
Solids	23.0	19.9	20.6	18.8	19.0
Crude Protein (Nx6.25)	20.8	17.2	17.4	16.4	17.8
Fat (ethyl ether extract)	1.0	1.6	2.5	0.3	0.3

* Results in grams per 100 grams of wet muscle.

Some of the colored fillets were cooked over steam and tasted. On being cooked, they changed in color from pink to a pale peach and had the odor and flavor of normal-colored fillets. Since they had been kept in frozen storage prior to the analyses, however, they were slightly downgraded in texture.

The author feels that there is no obvious reason why pigmented fillets containing astaxanthin should not be considered edible and acceptable to industry if the supply should increase.

9.3

transport, storage, or handling of fish and fish products shall at all times be kept absolutely clean. Except in wintertime, all fresh fish for human consumption must be iced shortly after they are caught, unless the fish are to be landed alive, and must be kept in ice after they are landed until the fish are frozen or processed or are in the hands of the consumer. With the exception of some fish such as herring and sprats, fish not to be landed alive must be cleaned and rinsed to remove completely all blood and entrails before they are landed.

Fish and fish products must be properly protected against wind and weather during transport. Wholesale, retail, or export trade must be approved in writing by the Ministry of Fisheries.

Quality assessment is usually made by organoleptic testing, although objective methods are used to a certain extent.

According to the Quality Law, manufacturing, freezing, and other processing of fish and fish products must take place only in an establishment authorized by the Ministry of Fisheries. Authorization is granted only if the establishment is easy to clean and if adequate and experienced personnel supervise production.

Regulations provide that fish-filleting plants producing fillets for export must have a separate room for heading, cleaning, and rinsing the fish before they are taken to the filleting room. The cut fillets must be rinsed and then cooled to a temperature just below zero, unless they are frozen immediately. Premises and equipment must be cleaned and disinfected as specified by regulations.

Fish and fish products for human consumption must be in a good, fresh condition when received for freezing or cold storage. Fish must be frozen only in freezers fitted for this purpose. The cold-storage room must be held at an average temperature of -20° C. or colder, and the temperature must not vary more than 2° C. either way.

Samples of canned fish must be inspected before any lot may be exported from Denmark.

7.80 (Cross Reference: 2.00)

Since about 1944, the Vancouver Station has conducted considerable research on the deterioration of cold-stored fish and the effect of antioxidants, gas storage, packaging, and glazing procedures in hindering development of oxidative rancidity. In this work, peroxide-value determinations and thiobarbituric acid values have been used as objective criteria of quality. It is very doubtful if these methods would be of much value in determining the condition of frozen fish taken from cold storage. There does not appear to be any good test, at present, that will indicate the degree of protein denaturation of fish.

Objective tests for quality of Pacific Coast fish have been carried out in laboratories in California, Washington, and Oregon. A test for total volatile reducing substances has been used experimentally in a few localities and seems to offer some promise. Work at the University of Washington has indicated that the trimethylamine tests may be of some value in determining the quality of certain species of Pacific sole. Tests conducted in a Seattle laboratory several years ago indicated that measurement of surface pH is of no real value in assessing quality of certain Pacific Coast fish.

The author feels that the best single test for bacteriological quality of fish would be a determination of the total bacterial population. Determination of any one chemical constituent or of mixed chemical constituents would be less reliable, since all bacteria present are not likely to form the given chemical substance, and thus the amount of the substance would depend on the proportion of the organisms present that formed that substance. It is doubtful, however, whether even bacteriological tests could be used as absolute criteria of quality. For example, they do not take into account such important grading factors as chalkiness in halibut, effect of fattiness as in spawning migration on quality, or parasitism.

9.16

60 lb. of nitrogen fertilizer was used per acre. Ten farmers who had grown rice after fish reported rice yields of 93 bu. an acre, the researchers noted.

More information on how fish farming benefits rice, fish stocking practices, and production problems and returns is given in Special Report No. 9, "Use of Reservoirs for Production of Fish in the Rice Areas of Arkansas." Single copies are free if requested through county extension offices in Arkansas, or directly from the Bulletin Room, Agricultural Experiment Station, University of Arkansas, Fayetteville.

0.36 BIOCHEMISTRY

Anonymous
Food Investigation 1957, Report of the Food Investigation Board (Great Britain), pp. 25-27 (1958)

(Abstract of this article appears under 0.32 page 1 - November 1959)

0.36 MUSCLE PHYSIOLOGY AND BIOCHEMISTRY

Anonymous
Food Investigation 1957, Report of the Food Investigation Board (Great Britain), pp. 36-37 (1958)

(Abstract of this article appears under 2.02 page 3 - November 1959)

0.36 LIPIDS OF THE MUSCLE OF TUNA, THYNNUS ORIENTALIS
V. FURTHER RESEARCHES ON THE PHOSPHOAMINOLIPIDS

Katada, Muneo; Zama, Koichi; and Igarashi, Hisano
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 9, 735-738 (1959) (English abstract)

The phosphoaminolipids obtained from cephalins of the muscle of a tuna, Thynnus orientalis, were converted to their dinitrophenyl (DNP) derivatives and subjected to chromatographic separation on a silic acid/celite (2:1) column to yield a DNP-ethanolamine-containing lipid and amino acid-containing lipids, which gave a DNP-serine-containing lipid and a mixture of DNP-serine-containing and DNP-threonine-containing lipids by rechromatography.

1.92 COLD STORAGE LIFE OF FRESH-WATER FISH--NO. 3.

Osterhaug, Kathryn L.
Commercial Fisheries Review 18, 16-18 (November 1956)

(Abstract of this article appears under 3.249 page 15 - May 1957)

1.92 A REVISED CHECK LIST OF THE FRESH-WATER AND ANADROMOUS FISHES OF CALIFORNIA

Shapovalov, Leo; Dill, William A.; and Cordone, Almo J. (Inland Fisheries Branch, California Department of Fish and Game)
California Fish and Game 45, 159-180 (July 1959) (California Department of Fish and Game, Sacramento)

2.01 STUDIES OF PUTREFACTION OF AQUATIC PRODUCTS--26. SPOILAGE OF FISH IN THE PRESENCE OF CARBOHYDRATES

Hibiki, Sigeyuki and Simidu, Wataru (Department of Fisheries, Kyoto University)
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 11, 913-915 (1959) (English abstract and figures)

Decomposition of histidine and the formation of volatile bases, trimethylamine, and histamine were inhibited and accompanied by a decrease in pH value by the addition of sucrose, glucose, or glycogen to minced fish. Starch was not as effective an inhibitor as sucrose, glucose, or glycogen.

27. Inhibition of histamine formation in spoiling of cooked fish and histidine content in various fishes. -- Ibid. 916-919. The formation of volatile base nitrogen and a decrease in pH were obtained by the addition of carbohydrates to fish that had been packed in a casing, cooked at 85° C. for 2 hours, and incubated at 30° C. Histamine did not occur. Heating at 60° C. and above killed the histamine-forming bacteria and prevented the formation of histamine.

Red muscle fishes contained histidine at a level of 1,000 mg. per 100 g. of muscle. The amount decreases, however, as the color of the muscle decreases. Mollusca and crustacea and white muscle fishes contain smaller amounts of histidine.

2.1126 A PREPARATIVE STUDY WITH TROUT FOR THE SALMON GILL-NET

Koike, Atushi; Kanda, Kenji; and Ogura, Mitio
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 1, 5-8 (1958)

Repelling effect of colors upon the fish passage increased in the daytime in the order: blue-green < gray < cutch-brown. In the twilight hour, this order was gray < blue-green < cutch-brown. The weather also may influence net color.

2.1126 CONSTRUCTION AND CATCH SELECTIVITY OF ALBACORE GILL NETS USED IN THE CENTRAL NORTH PACIFIC

Grahams, Joseph J. and Mann, Herbert J. (U. S. Bureau of Commercial Fisheries, Fisheries Biological Laboratory, Honolulu, Hawaii)
Commercial Fisheries Review 21, 1-6 (August 1959)

On the basis of data collected, the most productive net with which to fish albacore commercially in the central North Pacific will have a mesh size between $7\frac{1}{2}$ inches and $8\frac{1}{2}$ inches and a depth of 75 meshes.

GLOSSARY OF COMMON AND SCIENTIFIC NAMES OF FISH AND SHELLFISH*

Common name	Other common names	Scientific name
Alewife	Branch herring, big-eyed herring, river herring,	Pomolobus pseudoharengus
	Blueback, glut herring, shad herring	Pomolobus aestivalis
Anchovy		Engraulis mordax
Cod	Codfish	Gadus morhua (Atlantic)
		Gadus macrocephalus (Pacific)
Flounder:		
Gray sole		Glyptocephalus cynoglossus
Lemon sole		Pseudopleuronectes dignabilis
Yellowtail	Dab	Limanda ferruginea
Dab	Sea dab	Hippoglossoides platessoides
Blackback	Winter flounder	Pseudopleuronectes americanus
Fluke	Summer flounder, gulf flounder, flounder	Paralichthys species
'Sole'		Pleuronectidae and Bothidae species
'California halibut'		Paralichthys californicus
Haddock		Melanogrammus aeglefinus
Halibut		Hippoglossus hippoglossus (Atlantic)
		Hippoglossus stenolepis (Pacific)
Herring:		
Lake	Herring	Leucichthys artedi (Great Lakes, except Erie)
Round		Etrumeus sadina
Sea		Clupea harengus (Atlantic)
		Clupea pallasii (Pacific)
Thread		Opisthonema oglinum
Jack mackerel	Horse mackerel	Trachurus symmetricus
Lingcod	Cultus cod, blue cod, buffalo cod, ling	Ophiodon elongatus
Mackerel		Scomber scombrus (Atlantic)
		Pneumatophorus diego (Pacific)
Crab:		
Blue		Callinectes sapidus
Hard	Hard-shelled crab	Callinectes sapidus
Soft and peelers	Soft-shell crab	Cancer magister
Dungeness		Paralithodes camtschatica
King	Alaska king crab	Cancer irroratus (New England)
Rock		Cancer species (California)
Stone		Menippi mercenaria
Lobster:		
Northern		Homarus americanus (Atlantic)
Spiny	Sea crawfish, rock lobster	Panulirus argus (Atlantic)
		Panulirus interruptus (Pacific)
Shrimp	Prawn	Penaeus setiferus (South)
		Penaeus duorarum (Atlantic)
		Penaeus aztecus and Xiphopeneus kroyeri Gulf)
		Pandalus species (Atlantic and Pacific)
		Pandalopsis species (Pacific)
		Crago species (Pacific)
Menhaden	Mossbunker, pogy, fatback	Brevoortia species
Mullet	Jumping mullet, striped mullet, silver mullet	Mugil species
Ocean perch:		
Atlantic	Rosefish, redfish, red perch	Sebastes marinus
Pacific		Sebastodes alutus
Pilchard	Sardine	Sardinops caerulea
Pollock	Boston bluefish	Pollachius virens
Rockfish	Rock cod, snapper	Sebastodes species (Pacific)
Sablefish	Black cod	Anoplopoma fimbria
Salmon:		
Atlantic		Salmo salar (Atlantic)
Pacific:		
Chinook or king	Tyee, spring	Oncorhynchus tshawytscha
Chum or keta	Fall, dog	Oncorhynchus keta
Pink	Humpback	Oncorhynchus gorbuscha
Red or sockeye	Blueback	Oncorhynchus nerka
Silver or coho		Oncorhynchus kisutch
Spanish mackerel	Mackerel	Scomberomorus maculatus
Tuna and tunalike fishes:		
Albacore	Longfin tuna	Germo alalunga
	---	Thunnus saliens
Bluefin	Horse mackerel	Thunnus thynnus
	---	Thunnus secundodorsalis
Bonito		Sarda sarda (Atlantic)
		Sarda chiliensis (Pacific)
Little	Bonito, albacore, false albacore	Euthynnus alletteratus
Skipjack	Striped tuna	Katsuwonus pelamis
Yellowfin		Neothunnus macropterus
Whiting	Silver hake	Merluccius bilinearis
Clam:		
Cockle		Cardium corbis (Pacific)
Coquina	Pompano shells	Donax variabilis
	Butter	Saxidomus nuttali (Pacific)
Hard	Little neck	Paphia staminea (Pacific)
	Round clam, cherrystone, quahog, little neck	Venus mercenaria (Atlantic)
		Venus mortoni (Florida)
Ocean quahog		Cyprina islandica
Pismo		Tivela stultorum (Pacific)
Razor		Ensis species (Atlantic)
		Siliqua patula (Pacific)
Soft	Soft-shell clam, sand clam; nannynose, maninose	Mya arenaria
Surf	Skimmer	Spisula solidissima
Oyster:		
Eastern	Cove	Crassostrea virginica
Pacific (introduced)	Japanese	Crassostrea gigas
Western	Olympia, native	Ostrea lurida
Scallop:		
Bay		Pecten irradians (Atlantic)
		Pecten aequisulcatus (Pacific)
Sea		Pecten magellanicus

* Taken from Fishery Statistics of the United States 1955. Each species listed was caught in excess of 10,000,000 pounds in 1955.

2.118 FREEZING AND COLD STORAGE - PROTEIN DENATURATION AND FREEZING OF WHITE FISH AT SEA

Anonymous
Food Investigation 1957, Report of the Food Investigation Board (Great Britain), pp. 11-13 (1958)

(Abstract of this article appears under 3.2495, page 11 - November 1959)

2.118 FREEZING PLANT FOR WHALE MEAT AND LIVER ON BOARD SHIPS

Hoffmann, E. (Gesellschaft fur Linde's Eismachinen Aktiengesellschaft, Wiesbaden, Germany)
Bulletin de L'Institut International du Froid, 10th International Congress of Refrigeration (Paris) 39, 1048, 1051 (1959)

Special semiautomatic equipment has been constructed for freezing whale meat on board whalers. The meat is put into molds, cold brine is circulated to freeze, and hot brine is circulated to thaw. One plant produced 110 blocks of whale meat per hour. Each block weighs about 82 pounds. Each freezing unit contains 12 molds. Several of these units make up a line of vertical molds about 49 feet long. Above these units is a filling apparatus that is operated on rails. The frozen blocks are removed from the bottom of the molds, conveyed to the glazing tunnel, packaged, and conveyed to cold storage.

3.14 THE CONVERSION OF HERRING STICKWATER TO SOLUBLES III. PRESERVATIVE ACTION OF PENICILLIN G ON SALMON OFFAL STICKWATER UNDER PLANT CONDITIONS

Thomson, W. A. B.; Jonas, R. E. E.; MacLeod, R. A.; and Idler, D. R. (Technological Station, Vancouver, B. C.)
Progress Reports of the Pacific Coast Stations, Fisheries Research Board of Canada, No. 105, 27-30 (February 1956)

(Abstract of this article appears under 6.15 page 13 - November 1956)

3.14 PRESERVING HERRING FOR FLOUR AND OIL PRODUCTION

Vitenskap. Konsulent Kare Bakken (Olav Notevarp, inventor)
Norw. 92,373 (Sept. 1, 1958)
Chemical Abstracts 53, 14381b (August 10, 1959)

A $NaNO_2$ solution in amounts of 0.05 to 0.20 percent by weight of the raw material is used for preserving whole herring for storage prior to processing.

3.2493 FREEZING AND COLD STORAGE OF MACKEREL

Moojani, M. N.; Iyengar, J. R.; and Bhatia, D. S.
Food Sci. (Mysore) 7, 31-2 (1958)
Chemical Abstracts 52, 18949 (November 10, 1958)

In cleaned fresh mackerel stored at -20°, an objectionable off-flavor suggestive of fat spoilage appeared after 3 months and was quite pronounced by 5 months. There was neither much loss of tenderness nor development of toughness after 5 months. Peroxides increased and soluble protein nitrogen decreased during the storage.

3.2493 THE INFLUENCE OF TEMPERATURE, OXYGEN PARTIAL PRESSURE AND LIGHT ON THE SHELF LIFE OF SOME PREPACKAGED FOODS IN SELF-SERVICE STORES

Heiss, R. (Institut fur Lebensmitteltechnologie and Verpackung, Munich, Germany)
Bulletin de L'Institut International du Froid, 10th International Congress of Refrigeration (Paris) 39, 854, 856 (1959)

The quality of frozen fish fillets can be prolonged by storage under nitrogen. The importance of inert gas storage increases as the fat content increases.

3.333 STUDIES ON THE UNPLEASANT SMELL COMMON TO THE SALMON CANNED IN ELECTROLYTIC TIN-PLATE CAN

Koizumu, Chiaki and Nonaka, Junsaku
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 5, 378-380 (1958) (English abstract and tables)

The authors have verified that salmon packed in cans made of electrolytic tinplate is attended by the formation of a far larger amount of free hydrogen sulfide than is salmon packed in cans made of hot-dipped tinplate.

3.333 TECHNICAL PROBLEMS IN THE PROCESSING OF CANNED SALMON

Tanikawa, Eiichi (Univ. Hokkaido)
Mem. Fac. Fisheries Hokkaido Univ. 6, No. 2, 67-138 (1958)
Chemical Abstracts 53, 15411e (August 25, 1959)

The decomposition of canned salmon is attributed to understerilization of the cans. Several plots have been prepared that indicate how the freshness of raw salmon can be estimated when the time between catching and processing and the storing temperature of the raw materials are known. When the degree of freshness is known, the proper processing time can be determined at any processing temperature.

CONVERSION UNITS

1 pound = 453.59 grams

1 ounce = 28.350 grams

1 inch = 2.5400 centimeters

1 gallon = 128 ounces

1 gallon = 231 cubic inches

1 quart = 0.9463 liters

1 ounce = 29.573 milliliters

CONVERSION OF TEMPERATURE SCALES

$F = 9/5\ C + 32$

$C = 5/9\ (F-32)$

SPECIFIC HEAT AND HEAT OF FUSION

Average values of specific heat generally used for fishery products are 0.80 B.t.u. per pound per °F. above freezing and 0.40 B.t.u. per pound per °F. below freezing.

An average heat of fusion generally used for fishery products is 115 B.t.u. per pound. The heat of fusion of ice is 144 B.t.u. per pound.

DEFINITIONS

calorie	heat required to raise the temperature of 1 gram of water 1 degree Centigrade
British thermal unit	252 calories or the heat required to raise the temperature of 1 pound of water 1 degree Fahrenheit
ton of refrigeration	removal of heat at the rate of 12,000 B.t.u. per hour
atmospheric pressure normal	a pressure at sea level of 14.696 pounds per square inch, absolute
sensible heat	heat added to the body when its temperature is changed
latent heat	heat absorbed or evolved during a change of state, with no change of temperature
heat of fusion	heat absorbed when a solid melts, with no change of temperature
heat of vaporization	heat absorbed when a liquid vaporizes, with no change of temperature
heat of reaction	heat evolved or absorbed during a chemical reaction
heat transmission	flow of heat by conduction, convection, or radiation, singly or in any combination
horsepower	work performed at the rate of 550 foot pounds per second
mechanical equivalent of 1 B.t.u. of heat	heat given off by a total expenditure of 778 foot pounds of energy

COMMON ABBREVIATIONS*

A.	Angstrom unit(s)
a.c.	alternating current
alc.	alcohol, alcoholic
alk.	alkaline (not alkali)
amp.	ampere(s)
anhyd.	anhydrous
aq.	aqueous
at.	atomic (not atom)
at. wt.	atomic weight
Bé.	Baumé
biol.	biological
B.O.D.	biochemical oxygen demand
b.p.	boiling point
B.t.u.	British thermal unit(s)
cal.	calorie(s)
cc.	cubic centimeter(s)
cm.	centimeter(s)
d.	density (d_{13} specific gravity at 13° referred to water at 4°; d_{20}^{20}, at 20° referred to water at the same temperature)
d.c.	direct current
e.m.f.	electromotive force
Et	ethyl (Et_2O, ethyl ether)
e.v.	electron volt(s)
f.p.	freezing point
ft.	foot, feet
g.	gram(s)
γ	microgram(s)
hr.	hour
in.	inch(es)
kcal.	kilocalorie(s)
kg.	kilogram(s)
kv.	kilovolt(s)
kv.-amp.	kilovolt-ampere(s)
kw.	kilowatt(s)
kw.-hr.	kilowatt-hour
l.	liter(s)
lb.	pound(s)
m.	meter(s); also (followed by a figure denoting temperature) melts at, melting at
M.	molar (as applied to concn.)
ma.	milliampere(s)
Mc.	megacycle
mc.	millicurie
Me	methyl (MeOH, methanol)
meq.	milliequivalent
m.e.v.	million electron volts
mg.	milligram(s)
ml.	milliliter(s)
mm.	millimeter(s)
mγ	millimicrogram
mμ	millimicron(s)
mol.	molecule, molecular
mol. wt.	molecular weight
m.p.	melting point
μ	micron(s)
mv.	millivolt(s)
n	index of refraction (n_D^{20} for 20° and sodium light)
N	normal (as applied to concn.)
petr. ether	petroleum ether
p.p.m.	parts per million
ppt.	precipitate
pptd.	precipitated
pptg.	precipitating
pptn.	precipitation
qual.	qualitative (not qualitatively)
quant.	quantitative (not quantitatively)
r.p.m.	revolutions per minute
sol.	soluble
soln.	solution
sp. gr.	specific gravity
sp. heat	specific heat
sp. vol.	specific volume
sq. cm.	square centimeter(s)
U.S.P.	United States Pharmacopeia
v.	volt(s)
vol.	volume (not volatile)
w.	watt(s)
wt.	weight

* These abbreviations are used by Chemical Abstracts and, accordingly, have wide recognition.

3.4 BACTERIOLOGY

Anonymous
Food Investigation 1957, Report of the Food Investigation Board (Great Britain), pp. 24-25 (1958)

(Abstract of this article appears under 0.5 page 1 - November 1959)

3.4 FREEZING AND COLD STORAGE--KIPPERS AND MUSSELS

Anonymous
Food Investigation 1957, Report of the Food Investigation Board (Great Britain), pp. 13-14 (1958)

(Abstract of this article appears under 3.2493 page 9 - November 1959)

3.4 NEW TECHNOLOGY OF HOT SMOKING OF FISH

Lapszin, I. I.
Przemysl Spozyczy 12, 398-40 (1958)
Chemical Abstracts 53, 15412a (August 25, 1959)

Salted fish was immersed for 1 to 2 seconds in a solution of smoke and then treated with infrared rays, which brought about oxidation, condensation, and polymerization of smoke components. The smoke solution was obtained by extracting with water the condensate of products of wood gasification.

6.233 STUDIES ON THE FISH-LIVER CATALASE--V. OPTIMUM pH OF THE FISH-LIVER CATALASE

Fukuda, Hironari; Niguchi, Toshiaki; and Kurogi, Akira
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 10, 1097-1099 (1956) (English abstract, figures, and tables)

6.233 SHARK-LIVER OIL II. RECOVERY OF VITAMIN A BY DIFFERENT DIGESTION METHODS

Ali, S. Maqsood; Haq, Abdul; and Mahdihassan, S. (Pakistan Council Sci. Ind. Research, Karachi)
Pakistan J. Sci. Ind. Research 1, 156-7 (1958)
Chemical Abstracts 53, 12588b (July 10, 1959)

Livers of two species of shark were treated with water, steam, alkali, papain, or ether extraction to find conditions for optimal recovery of both oil and vitamin A. The yields of oil (percent) and vitamin A (in million units/kg. liver) in the case of P. cuspidatus by these methods was water: 38, 4.7; 2 percent alkali: 50, 7.8; 1 percent crude papain: 48, 7.2; steam: 38, 5.4; ether: 56, 7.7, respectively. Similar results were obtained with S. blochii. The best extraction method was by alkali digestion which gives oil with highest potency and lowest acidity.

4.3 INFRARED SPECTRA AND THE POLYMORPHISM OF GLYCERIDES. PART IV. MYRISTOPALMITINS AND MYRISTOSTEARINS

Chapman, D.
Journal of the Chemical Society, pp. 3186-3188 (September 1958)

The polymorphism of some myristic-palmitins and -stearins has been investigated by infrared spectroscopy between 1800 and 650 cm.$^{-1}$. Data on the transitions have been obtained.

4.3 ABSORPTION OF GASES BY WHALE OILS II. ABSORPTION OF NITROGEN BY WHALE OILS

Ishikawa, Yasutaro (Univ. Hiroshima, Fukuyama)
Sci. Repts. Whales Research Inst. (Tokyo) 13, 309-21 (1958)
Chemical Abstracts 53, 14548b (August 10, 1959)

6.34 INFORMATION AND EVALUATION OF ALGINATES I.

Diemari, Willibald and Weichel, Hans Hermann (Univ. Lebensmittel-chem., Frankfurt a. M. Ger.)
Deut. Lebensm. -Rundschau 54, 51-5, 76-9 (1958)
Chemical Abstracts 53, 9497a (May 25, 1959)

Characteristics and evaluation of 74 commercial alginates are reviewed with regard to taste, color, presence of foreign material, chemical compounds, physical properties, and presence of heavy metals.

II. Ibid. 151-5. This is a study of the precipitation of alginates and other thickening agents with a 10-percent solution of calcium chloride, Zwikker's solution plus sulfuric acid, a solution containing 0.5 percent iodine and 1 percent potassium iodide, saturated copper sulfate solution, and a 5-percent solution of lead acetate.

III. Ibid. 274-7. The alginates show stabilizing activity for L-ascorbic acid. Model enzymes, diastase, trypsin, pancreatin, papain, and lipase decompose or precipitate alginates.

6.34 SODIUM ALGINATE AS A BLOOD-PLASMA SUBSTITUTE

Tomoda, Masanobu; Iguchi, Kiyoshi; and Ikeda, Eichi
Japan 4593 ('58) June 11
Chemical Abstracts 53, 9584i (May 25, 1959)

An aqueous solution containing 0.4 percent depolymerized sodium alginate, 5 percent glucose, 0.9 percent NaCl, and 0.01 N each of citric acid and Na_2HPO_4 is filled in ampuls and sterilized by heating for 1 hour at 100° to give a blood-plasma substitute.

ADDRESSES OF PUBLICATIONS ABSTRACTED FOR COMMERCIAL FISHERIES ABSTRACTS

DOMESTIC PUBLICATIONS

Analytical Chemistry
American Chemical Society
20th & Northampton Streets
Easton, Pennsylvania

Archives of Biochemistry & Biophysics
Academic Press, Inc.
Prince & Lemon Streets
Lancaster, Pennsylvania

ASHRAE Journal
American Society of Refrigerating and Air-Conditioning Engineers, Inc.
234 Fifth Avenue
New York 1, New York

California Fish and Game
Editor
Department of Fish and Game
722 Capitol Avenue
Sacramento 14, California

Chemical Abstracts
American Chemical Society
20th & Northampton Streets
Easton, Pennsylvania

Chemical and Engineering News
American Chemical Society
20th & Northampton Streets
Easton, Pennsylvania

Chemical Engineering
McGraw-Hill Publishing Co.
330 W. 42nd Street
New York, New York

Chemical Processing
Putman Publishing Co.
111 East Delaware Place
Chicago 11, Illinois

Commercial Fisheries Review
Director, Bureau of Commercial Fisheries
Division of Industrial Research and Services
Fish and Wildlife Service
Department of the Interior
Washington 25, D. C.

Drug and Cosmetic Industry
Drug Markets, Inc.
101 W. 31st Street
New York, New York

Federation Proceedings
Federation of American Societies for Experimental Biology
9650 Wisconsin Street
Washington 14, D. C.

Feed Bag, The
Editorial Service Company
1712 West St. Paul Avenue
Milwaukee 3, Wisconsin

Feedstuffs
Miller Publishing Co.
118 South 6th Street
Minneapolis 2, Minnesota

Fish Boat, The
H. L. Peace Publications
624 Gravier Street
New Orleans 12, Louisiana

Fishing Gazette
Fishing Gazette Publishing Corp.
461 Eighth Avenue
New York, New York

Food Engineering
McGraw-Hill Publishing Co., Inc.
330 W. 42nd Street
New York 18, New York

Food Processing
Putman Publishing Co.
111 East Delaware Place
Chicago 11, Illinois

Food Research
The Garrard Press
510 North Hickory Street
Champaign, Illinois

Food Technology
Institute of Food Technologists
11606 South Bell Avenue
Chicago 43, Illinois

Frosted Food Field
Frosted Food Field, Inc.
19 W. 44th Street
New York 18, New York

Industrial and Engineering Chemistry
American Chemical Society
1155 - 16th Street, N.W.
Washington 6, D. C.

Industrial Refrigeration
Nickerson & Collins Co.
433-435 N. Waller Avenue
Chicago, Illinois

Journal of Agricultural and Food Chemistry
American Chemical Society
20th & Northampton Streets
Easton, Pennsylvania

Journal of the American Chemical Society
American Chemical Society
1155 - 16th Street, N.W.
Washington 6, D. C.

Journal of the American Dietetic Association
American Dietetic Association
620 North Michigan Avenue
Chicago 11, Illinois

Journal of the American Oil Chemists' Society
The American Oil Chemists' Society
35 E. Wacker Drive
Chicago 1, Illinois

Journal of the Association of Official Agricultural Chemists
Association of Official Agricultural Chemists
P. O. Box 540
Benjamin Franklin Station
Washington, D. C.

Journal of Biological Chemistry
The American Society of Biological Chemists, Inc.
Mt. Royal & Guilford Avenues
Baltimore, Maryland

Journal of Nutrition
The Wistar Institute of Anatomy & Biology
36th St. at Spruce
Philadelphia 4, Pennsylvania

Journal of Organic Chemistry
American Chemical Society
20th & Northampton Streets
Easton, Pennsylvania

Maine Coast Fisherman
Maine Coast Fisherman, Inc.
Belfast, Maine

Modern Packaging
Modern Packaging Corporation
575 Madison Avenue
New York 22, New York

National Fisherman
Atlantic Fisherman, Inc.
Goffstown, New Hampshire

National Provisioner
National Provisioner, Inc.
15 W. Huron Street
Chicago 10, Illinois

Nutrition Reviews
Nutrition Foundation, Inc.
99 Park Avenue
New York 16, New York

Pacific Fisherman
Miller Freeman Publishing, Inc.
500 Howard Street
San Francisco 5, California

Poultry Science
Poultry Science Association
Kansas State College
Manhattan, Kansas

Progressive Fish-Culturist
U. S. Department of the Interior
Bureau of Sport Fisheries and Wildlife
Fish and Wildlife Service
Washington 25, D. C.

Quick Frozen Foods
E. W. Williams Publishing, Inc.
82 Wall Street
New York 5, New York

Science
American Association for the Advancement of Science at the Business Press
1515 Massachusetts Avenue, N.W.
Washington 5, D. C.

Seafood Merchandising
H. L. Peace Publications
624 Gravier Street
New Orleans 9, Louisiana

Western Canner/Packer
The Canner Publishing Co.
817 West Market Street
Louisville, Kentucky

Western Feed & Seed
Western States Publications
320 Market Street
San Francisco 11, California

FOREIGN PUBLICATIONS

Analyst, The
14 Belgrave Square
London, S.W., 1, England

Annual Report of the Fisheries Research Board of Canada
Fisheries Research Board of Canada
Ottawa, Ontario, Canada

Biochemical Journal, The
Cambridge University Press
Bentley House
200 Euston Road
London, N.W., 1, England

Biochemistry
(Publication of the Academy of Science of the USSR)
Consultants Bureau, Inc.
227 W. 17th Street
New York 11, New York

Bulletin of the Japanese Society of Scientific Fisheries
Japanese Society of Scientific Fisheries
c/o Tokyo Suisan Daigaku
Shiba-kaigandori 6-Chome
Tokyo, Japan

Bulletin of the Faculty of Fisheries, Hokkaido University
Faculty of Fisheries
Hokkaido University
Hakadote, Japan

Canadian Fisherman
National Business Publications, Ltd.
Gardenvale, Quebec, Canada

Canadian Journal of Biochemistry & Physiology
Division of Administration and Awards
National Research Council
Ottawa 2, Ontario, Canada

Canadian Journal of Chemical Engineering
The Chemical Institute of Canada
18 Rideau Street
Ottawa 2, Ontario, Canada

Canadian Journal of Chemistry
Division of Administration and Awards
National Research Council
Ottawa 2, Ontario, Canada

Chemistry & Industry
14 Belgrave Square
London, W., 1, England

Fette-Seifen-Anstrichmittel
Industrieverlag von Hernhaussen KG
Hamburg 11, West Germany

Fisheries Newsletter
Commonwealth Director of Fisheries, Department of Primary Industry
Canberra, Australia

Food Manufacture
Leonard Hill, Ltd.
Eden Street
London, N.W., 1, England

Food Preservation Quarterly
Division of Food Preservation and Transport
Commonwealth Scientific and Industrial Research Organization
Sydney, Australia

Journal of Applied Chemistry
The Society of Chemical Industry
14 Belgrave Square
London, S.W., 1, England

Journal of the Fisheries Research Board of Canada
University of Toronto Press
Ottawa, Ontario, Canada

Journal of the Science of Food and Agriculture
The Society of Chemical Industry
14 Belgrave Square
London, S.W., 1, England

Modern Refrigeration
Maclaren House
131 Great Suffolk Street
London, S.E., 1, England

Nature
MacMillan & Co., Ltd.
St. Martin's Street
London, W.C., 2, England

Norwegian Fishing News
Kaigaten 8
P. O. Box 222
Bergen, Norway

Progress Reports of Atlantic Coast Stations
Fisheries Research Board of Can.
St. Andrews, New Brunswick, Can.

Progress Reports of Pacific Coast Stations
Technological Station
898 Richards Street
Vancouver 2, B.C., Canada

Report of the Food Investigation Board (Great Britain)
Department of Scientific and Industrial Research
Charles House
5-11 Regent Street
London, S.W., 1, England

Trade News
Director of Information and Educational Service
Department of Fisheries
Ottawa, Ontario, Canada

Western Fisheries
Roy Wrigley Publications, Ltd.
1104 Hornby Street
Vancouver 1, B. C., Canada

World Fisheries Abstracts
FAO Fisheries Division
Technology Branch
Viale delle Terme di Caracalla
Rome, Italy

World Fishing
John Trundell, Ltd.
St. Richards House
Eversholt Street
London, N.W., 1, England

6.72 STUDIES ON CRYSTALLINE WHALE INSULIN IV. STRUCTURE OF SPERM- AND SEI-WHALE INSULINS

Ito, Yasuzo
Bulletin of the Faculty of Fisheries Hokkaido University 9, 127-137 (August 1958) (English abstract)

The amino-acid sequences in both insulins were compared. The sequence in positions 8 to 10 in the glycyl chain of oxidized sperm-whale insulin was threonine, serine, and isoleucine; whereas in sei-whale insulin the sequence was alanine, serine, and threonine.

6.72 CUCUMBER "CURE"

Anonymous
Newsweek LIV, No. 10, 77 (September 7, 1959)

Dr. Ross Nigrelli, pathologist at the New York Aquarium, recently reported that the poison, Holothurin, from sea cucumbers (1) is effective in controlling the growth of certain cancers in mice, (2) is a potent local anesthetic, and (3) a powerful heart stimulant.

7.51 ON ACTOMYOSIN OF SQUID MUSCLE FROM SALT-EXTRACT PREPARATION OF ACTOMYOSIN

Matsumoto, Juichiro J. (Tokai Regional Fisheries Research Laboratory)
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 2, 125-132 (1958) (In English)

By extracting squid muscle for 10 minutes with 0.6 M KCl, followed by precipitation 3 times with 0.2 M KCl, a preparation was obtained that probably is actomyosin from squid. The preparation, if dissolved in 0.5~0.6 M KCl solution was opalescent, highly viscous, and intensely streaming birefringent.

7.51 STUDIES ON THE DISCOLORATION IN FISH MEAT DURING FREEZING STORAGE

Sano, Yoshihiko and Hashimoto, Kanehisa
Bulletin of the Japanese Society of Scientific Fisheries 24, Nos. 6 and 7, 519-523 (1958) (English abstract, figures, and tables)

I. A spectrophotometric method for the simultaneous determination of ferrous and ferric forms of myoglobin in their mixed solution.

7.51 A NEW PHOTOMETRIC METHOD FOR DETERMINATION OF SMALL AMOUNTS OF PROTEIN

Heinzel, W. and Neuhoff, V. (Univ. Tubingen, Ger.)
Naturwissenschaften 46, 146 (1959)
Chemical Abstracts 53, 14208i (August 10, 1959)

7.593 SPECTROPHOTOMETRIC DETERMINATION OF TOTAL NUCLEIC ACID CONTENT

Spirin, A. S. (Institute of Biochemistry, AN SSR, Moscow)
Biochemistry (U.S.S.R.) 23, 617-622 (September-October 1958)

Summary. -- A simple spectrophotometric method for the determination of the sum of the ribo- and desoxyribonucleic acid contents of biological material depends on the extraction of the material with hot 0.5 N perchloride acid, centrifuging, and determining the absorption of the supernatant solution at 270 mμ and at 290 mμ. The total nucleic acid content in micrograms of nucleic acid phosphorus per ml. of solution is calculated by dividing the difference between the optical densities at 270 and 290 mμ by the factor 0.19

$$(C\ \mu gP - NA = \frac{D_{270} - D_{290}}{0.19}).$$

7.593 ON THE FORMATION OF AMINE IN FISH MUSCLE III. SIMPLE METHOD FOR THE DETECTION OF HISTAMINE IN FISH MUSCLE

Ota, Fuyuo
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 1, 37-40 (1958) (English abstract and table)

To obtain fish muscle extract, add 20 volumes of water, or successively 10 volumes of water and 5 percent CCl_3COOH to 1 volume of muscle, shake, and filter. To 1.0 cc. of the extract, add 2.0 cc. of 2.0 percent Na_2CO_3. To the above solution, add 1 cc. of diazo-reagent. After brief standing, add 7 cc. of ethylacetate and shake vigorously. Histamine concentration was measured roughly from the intensity of the rose color of the ester layer.

7.80 POLAROGRAPHIC STUDIES ON THE SMELL OF FISH AND WHALE MEAL AND OIL

Okada, Ikunosuke; Osakabe, Isami; Kikuchi, Takeaki; and Moriwake, Eiji
J. Tokyo Univ. Fisheries 39, 177-84 (1953)
Chemical Abstracts 52, 20746 (November 25, 1958)

Polarographic characteristics were determined for meat distillate (Balaenoptera physalus and Cololabis saira) and for volatile substances of fish oil (liver oil of Deania eglantina and Scymnorhinus licha, body oil of B. physalus) in order to determine the components producing fish odor and rancid odor.

7.80 STUDIES ON THE BUFFERING CAPACITY OF FISH MUSCLE I. THE BUFFERING CAPACITY AS A MEASURE OF FRESHNESS

Suyama, Michizo and Tokuhiro, Tadashi
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 4, 267-270 (1958) (English abstract, figures, and tables)

The buffering capacity of fish muscle and muscle extractives was studied to test its value as a criterion of the degree of freshness of fish muscle. Judgment of freshness by buffering capacity did not prove accurate, but a measure of the so-called B-value proposed by Stansby et al. (1953) was found to be promising. The muscle of elasomobranch shows a higher degree of buffering than the muscle of common fish owing to the abundance of trimethylamine oxide.

II. Effects of trimethylamine oxide and urea on the buffering capacity. --Ibid. 271-275.

III. Effects of trimethylamine and ammonia on the buffering capacity of fish muscle and the change in the capacity during degradation. --Ibid. 276-280.

IV. Buffering capacity of muscles of some marine animals. --Ibid. 281-284.

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8.0 COMPOSITION OF DILIS FISH FLOUR

Alcaraz-Bayan, Angelina and Leverton, Ruth M. (Oklahoma State Univ., Stillwater)
Philippine J. Sci. 86, 247-58 (1957)
Chemical Abstracts 53, 13441f (July 25, 1959)

Raw fish flour was prepared by thoroughly powdering dried, washed, whole fish. Deodorized fish flour was prepared by extracting raw fish flour three or four times with alcohol and drying the residue at low temperature.

8.0 CHEMICAL STUDIES ON MYTILUS EDULIS OF THE VIGO ESTUARY

Molins, Lorenzo Rodriguez and Rial, Jose Ramon Besada
Bol. inst. espan. oceanog. No. 87, 29 pp. (1957)
Chemical Abstracts 53, 7445g (April 25, 1959)

Mussels from various stations in the Vigo estuary yielded (1) 99.24 calories per 100 grams; (2) the following average percentage composition: waste 77.72, edible portion 22.28, moisture 76.91, fat 1.94, protein 12.70, total carbohydrate 7.03, glycogen 3.15, and total ash 1.42 (soluble ash 0.44, insoluble ash 0.98); and (3) the following minerals in milligrams per 100 grams: NaCl 26.5, Ca 70.8, P_2O_5 343.5, Fe 6.10, Cu 0.124, and Pb 0.0059.

8.0 CHEMICAL COMPOSITION OF FISH PRESS FLUIDS

Vorotnikov, Yu A. (A. I. Mikoyan Tech. Inst. Fish. Ind. and Economy, Moscow)
Izvest. Vysshikh Ucheb. Zavedenii, Pishchevaya Tekhnol. No. 3, 73-7 (1958)
Chemical Abstracts 53, 3528d (February 25, 1959)

8.8 TECHNICAL NOTE NO. 41.--BACTERIAL STUDIES OF FROZEN, RAW, BREADED SHRIMP

Kern, Jerome
Commercial Fisheries Review 19, 11-14 (December 1957)

(Abstract of this article appears under 3.236 page 11 - April 1958)

8.8 FREE AMINO NITROGEN CONTENT AS AN INDEX OF QUALITY OF ICE-STORED PRAWNS

Velankar, N. K. and Govindan, T. K. (Central Marine Fisheries Research Sta., Mandapam Camp)
Current Sci. (India) 27, 451-2 (1958)
Chemical Abstracts 53, 11698f (June 25, 1959)

Decrease in amino nitrogen is more regular than decrease in orthophosphate. Definite ranges of amino nitrogen values are associated with the number of days in ice storage. The rapid decrease in amino nitrogen is arrested about the 6th or 7th day. Leaching by contact with melting ice is the most significant factor.

8.7 CHEMICAL CHARACTERISTICS OF FISH OIL PREPARED IN VACUO

Berzins, L.
Trudy Inst. Eksptl. Med., Akad, Nauk Latv. S.S.R. 14, 165-7 (1957)
Referat, Zhur. Khim., Biol. Khim, Abstr. No. 20037 (1958)
Chemical Abstracts 52, 21172b (November 25, 1958)

8.7 UNITED STATES STANDARDS FOR GRADES OF FROZEN HADDOCK FILLETS

Anonymous
Federal Register 23, No. 246, 9759-61 (December 18, 1958)

8.7 UNITED STATES STANDARDS FOR GRADES OF FROZEN HALIBUT STEAKS

Anonymous
United States Standards, 4 pp. (March 1959) (First Issue) (U. S. Department of the Interior, Bureau of Commercial Fisheries, Division of Industrial Research and Services, Washington 25, D. C.)

9.13 METABOLIC PATTERNS IN BIVALVES

Ishida, Shuzo and Tsuzuki, Kiyoshi (Chiba Univ.)
Chiba Daigaku Bunri Gakuba Kiyo Shizen Kagaku 1, 267-9 (1955) (In English)
Chemical Abstracts 52, 15759 (September 25, 1958)

V. Distribution of the uricase activity in the bivalves, Meretrix meretrix lusoria and Venerupis philippinarum. --Uricase activity of gill, mid-gut gland, mantle, and foot tissue extracts was determined in Meretrix and Venerupis in order to elucidate purine catabolism in bivalves.

VII. Some aspects of the purine metabolism in the clam, Meretrix meretrix lusoria. -- Xanthine oxidase activity is determined in Meretrix tissues, using hypoxanthine as substrate. Order of activity for the tissues studies is: foot > mid-gut gland > gill = adductor muscle > mantle. A probable route of purine catabolism is discussed: guanine → xanthine → uric acid or guanine → urea CO_2 → NH_3.

9.13 GLUCURONIDE SYNTHESIS IN FISH AND THE INFLUENCE OF TEMPERATURE

Dutton, G. J. and Montgomery, J. P. (University of St. Andrews, Dundee, Scotland)
Biochemical Journal 70, 17p (December 1958)

The study in various animals of glucuronide synthesis involving enzymic transfer of glucuronic acid from uridine diphosphate glucuronic acid to acceptors has been extended to the trout Salmo fario.